The Metalworking Weekly

EDITORIAL INDEX

VOLUME 161
July 1 to December 31, 1967

Subject Index 3
Company Index 15

THE PENTON PUBLISHING COMPANY

Penton Building, Cleveland, Ohio 44113

Settlements: See Labor

Automotive:

door sedans (checklist chart), dimensions, engines, accessory prices, 10/2, p.33 per models, winners and losers, 7/24 n.37

1967 models, winners and losers, 7/24, p.37
1968 model startup: 400,000 by Sept. 6, 7/24, p.35
1968 prices mulled by automakers, Washington Safety Agency watches, 8/7, p.35
1968 prices, autodom's juggling act, 10/2, p.31
1968 model production, can it top 8 million? 8/21, p.27
1968 engineering funneled into safety features, serviceability, 9/18, p.35
1968 ist quarter outlook, 11/27, p.30

1968 1st quarter outlook, 11/21, p.30
Auto sales for '68 during a strike forecast, 10/23, p.99
AMC trains for new battle, '68 press review, 8/28, p.35
Antiskid device, Kelsey-Hayes, 8/14, p.21
Australian automakers hit by imports, Jap challenge, 12/11, p. 80
Auto aftermarket, new forces re-

Auto aftermarket, new forces re-shape, 7/31, p.25 Auto price hikes a certainty (Ford's Iacocca), 9/4, p.17 Auto thefts, can automakers foil professional car thieves, 12/18, p.34

professional car thieves, 12/18, p.34
Autodom's stake in transportation systems of tomorrow, interviews with Ford's Seward and GM's Spreitzer, 10/9, p.35
Big Three-UAW meet July 10: Autodom's 'long hot summer' nears, issues pending, 7/3, p.25
Canadian wage parity: Boon or bane? Chrysler-UAW agreement, 11/20, p.35
Car dealers will modernize facilities, 10/2, p.21
Chrysler looks at turbines, electric cars, test equipment, 9/11, p.35
Chrysler's new V-8 engine has aluminum-tin main bearings, 11/27, p.22
Curved chrome for auto trim reduces glare, 10/23, p.24
Electrical systems tested with Sercon, new device, 7/17, p.31
Electroplated plastics for exteriors, outlook, 11/13, p.21
Fastener quality upgraded, 7/17, p.21
Ford aims for collapsible front,

outlook, 11/15, p.21
Fastener quality upgraded, 7/17, p.21
Ford aims for collapsible front, 9/4, p.23
Ford banks on Lincoln-Mercury to lead upsurge, 9/4, p.30
Ford co-ops with Landis Machine in design and production of gear rolling machine (rolled vs shaved gears), 9/11, p.71
Ford experiments with front leaf springs, modified Ausform process, 10/2, p.21
Ford: Making up for strike, 500, 000 'lost' cars, 11/6, p.34
Fuel cell outlook dim: Ford research manager, 9/4, p.23
GM strives for 'white noise,' 10/16, p.25
CM-LIAW: Automation: Issue or

p. 25 GM-UAW: Automation: Issue or 'smoke screen,' 12/11, p. 43 Maintenance (by 1977): Serviced by plug-in parts, 8/28, p. 23 Microwave heating system, Varian Associates, 12/4, p. 31 Plastics boom shakes Detroit (STEEL Feature), 12/18, p. 41 Plastics gain in auto industry, uses, 7/17, p. 35 Plastic bumpers for Pontiac, 8/7, p. 21

p.21
Plastic grilles, instrument panels, 10/23, p.37
Plastics fabricating techniques, solid phase forming, structural foam molding, etc., 12/25, p.18
Pontiac gets solid state regulator, 2/28, p.32 8/28, p.23

8/28, p.23
Rioting in Detroit slows autodom pace, absenteeism, 7/31, p.13
Safety, government programs (agency's calendar), occupant protection and vehicle lighting top priority, 8/14, p.35
Safety targets for 1970, Detroit takes aim, 10/30, p.34

Safety test with experimental cars, 8/21, p.13

Safety standards, limited exemption endorsed by Haddon, Highway Safety Bureau director, 9/11, p.76

Safety's impact on suppliers, 9/25,

p.38
Safety: Mandatory vehicle inspection, is it worth the cost? 12/4,

p. 35 r. worth the costs 12/4, p. 35 small car competes with foreign makes, 9/4, p.17 steel honeycomb for autos possible, 10/23, p.24 stockpiling. . . Detroit plans steel strike hedge, 11/6, p.19 Turbine engines to replace piston engines: Chrysler's Huebner before Senate antitrust hearing, 10/16, p.54n*
Turbine race car built by Howmet, 11/27, p.31 Zinc: How the auto campaign is going (1967-'68 model materials usage, chart), 10/23, p.35

Balance of Payments: U. S. trade balance to improve, FTCI forecast, 7/10, p.21

Bars: Stellite Wks.: Cold mill produces precision bars and pipe, Kokomo, Ind., 8/28, p.70*

Batch Manufacturing: British system (Molins Machine Co.) cuts machining labor costs (small parts), 11/20, p.62

Battelle Memorial Institute:
Cold extrusion steel consumption,
growth predicted, 8/7, p.70
Cold extrusion studied, 9/25, p.31
Copper plating via ultrasonics,
12/18, p.29
Crucible development program,
P/M, 12/11, p.19
Dr. Jaffee: Reports refractory research, metals and coatings,
10/9, p.58b*
Electric underwater tool is safe,
10/30, p.29
Hydrogen induced cracking useful
to study stresses in complex
welding, 9/4, p.27
Shipping container cools atomic
heat, SNAP-27, 7/31, p.21
Research—how sulfur affects air
pollution, 7/10, p.32
Titanium supply short for 10
years, estimates of shipments,
11/13, p.31

Battery electrodes by gas plating, 8/28, p.25 Energy paper battery developed, 12/4, p.21

Souped up storage battery delivers 500 watts of electrical power per pound of weight, 8/21, p.23

Bearings Industry: 4th quarter market trend: Imports, war shake up industry, 9/18, p.154

Bearings, Bushings:
Air bearing holds 15 lb thrust,
English firm, 11/13, p.29
Aluminum-tin alloy main bearings,
Chrysler, 11/27, p.22
Analytical tool zeroes in on trace
elements, test fatigue life, 12/18,
p.56a** p.56a.*

Bearing design better with visual evaluation of lubricant, 11/6,

evaluation of documents of the p. 67
NASA mechanic demonstrates ball bearing for 1,800 F environment (cover pic.), 7/10
Polymer bearings, isostatic pressing, JPL lab, 10/23, p.27
Rotary quench provides hardness for small parts, Surface Combustion, 9/18, p.88

Beryllium: Long-length beryllium sheet, cross rolled, 9/18, p.29

Boating Market: 1967 sales pass \$3 billion mark, 10/2, p.19

Bonding: See Joining

Brazing: See Joining

British Iron & Steel Research Assn.:

Assn.:
Aluminizing steel with dry powder, tech. new, 12/18, p.27
Black plate annealing process, 10/16, p.17
Electroslag refining units made commercial, 11/13, p.31

British Welding Research Assn.: Carbon dioxide laser coupled with oxygen jet cuts metal, 9/18, p.126d*

Broaching: See Machining

Bureau of Mines:

Anorthosite plentiful (rock of feld-spar, a form of aluminum silicate), 8/21, p.13
Dr. Hibbard: Material engineers must promote reclamation and reuse of materials, 7/3, p.15
Ore grade values estimated, 8/14, p.27

Bureau of National Affairs Inc.: Wage settlements, 1967, 10/23, p.21

Bureau of Standards: Metal fingerprinted for easy iden-tification, 8/14, p.72g*

Business & Defense Services: Copper base set-asides changed, 11/20, p.23

Business (Economy): 1st half sales-profits, firms, 8/14,

nd quarter profit slows, First Nat'l Bank of New York, 8/21,

nd half upturn forecast by First Nat'l Bank of Chicago, 7/10,

2nd hair upturn forecast by First Nat'l Bank of Chicago, 7/10, p.91
2nd haif, what's ahead (Asst. See'y-commerce, Dr. Shaw), 8/14, p.19
1967 imponderables—war, taxes, inflation that still face 1968, 12/25, p.4
1968 forecast, six major questions, 9/4, p.6
1968 forecast, STEEL, managers' planbook, 10/2, p.39
1968 forecast, FTof. Suits, U. of Michigan, 11/27, p.31
1968: Run to stay even, 12/18, p.5
1972: Trillion dollar economy possible (Irving Trust-Cooper), 11/27, p.19
Corporate spending on plant and equipment-1968, prediction of

sible (Irving Trust-Cooper), 11/27, p.19

Corporate spending on plant and equipment-1968, prediction of L. A. banker, 10/2, p.17

Pr. Rinfret (economist): Major boom in offing, 11/20, p.19

Economic growth illusion due to prices, cost of living (Argus Research), 9/11, p.7

Economy checks off 80 months of business growth, progress since Mar. '61, 11/13, p.7

Heller, Reuther spar on inflation, Economic Club of Detroit, 10/9, p.21

Inflation, No. 1 concern, 11/27, p.7

Manufacturing executive survey: Dun & Bradstreet, 9/18, p.156

Metalworking, what managers expect in 1968, 11/27, p.49

Metalworking sales and profits, 1967-66, 1st 9 mo., 11/6, p.6

Retail sales, '68 forecast by Boston consultant, 11/6, p.99

STEEL's Panel, semiannual survey, 9/18, p.7

Wages, prices play leapfrog, unit cost of labor in manufacturing, 7/31, p.5

Business Equipment: Industry report, 10/30, p.103

Buy American: See Government

Canada:
Brain drain loss, 8/21, p.15
Housing needs, 7/31, p.15
Boosts mineral output, 11/6, p.32
Chrysler-UAW wage parity provisions, boon or bane? 11/20 11/20,

p.35 How Canada will refund tariff on machinery and equipment, 12/18,

Iron ore from British Columbia may be priced out of Japanese market, 11/13, p.32 U. S. metal markets sought, 7/24, p.32

Cans, Canmaking: Aluminum for containers, 7/31,

Capital Expenditures: 1968 metalworking outlays to level off, 11/27, p.49 Construction expenditures forecast,

Construction expenditures forecast, 10/16, p.5
Editorial: Capital spending—where do we go from here? 11/6, p.17
New England investment high, 12/11, p.138

Industry group cosponsor dev. of standards for measuring carbide impact strengths, 8/21, p.50h*

Case Western Reserve University: Dr. Barloon: Market forecast for marine cargo containers (fishy-backs), 12/18, p.80

Casting, Castings:
Argon cover ends continuous cast-

Argon cover ends continuous casting problem (Impact) at Roblin Steel, 12/25, p.31
Casting ferroalloys by new tech., Airco, 7/10, p.21
Continuous casting for zinc strip (AZP), 7/17, p.83
Continuous casting unit, Mannesmann works, 7/31, p.48f
Czechs check gray iron castings, 8/14, p.31
Electroslag melting, casting large ingots, 7/31, p.39
Frankford Arsenal tests countergravity casting for aluminum alloys in green sand molds, 11/6, p.27
Gray iron casting, thin walled

ray iron casting, thin walled, made in all-metal molds, 8/21, p.21

p.21
Hungarian plant makes cast bathtubs, 8/28, p.28
Investment casting automated, Russia, 8/28, p.28
Japs develop continuous casting tech., 9/4, p.68b*
Plastic parts molded in one step, Intermold tech., 9/18, p.29
Porous plug (Gazal process) improves iron castings, 10/9, p.58q*
Porous plug (Gazal) process cuts

Porous plug (Gazal) process cuts ductile iron costs, 11/6, p.63
Pressure cast speeds tubemaking, British, 12/25, p.15
Steel castings, market trend, 7/10, p.92

p.92
Vacuum casting large sputtering electrodes, 12/4, p.25
Vibratory and ultrasonic energy improves castings during solidification, Russia, 10/2, p.25

Census: Cities growth rate slowing, 7/17, p.25

Quick freeze improves ceramics, Bell Lab, 7/17, p.29

Charts, Tables:

uto comparisons checklist for 1968, 10/2, p.33 lad metals, developing future (Texas Instrument lists), 9/18,

Managers' handbook anagers' handbook feature Where are your markets? 10/2

p.52
Selection of forming lubricant,
Magnus Chemical, 10/16, p.41
Semifinished aluminum imports
from foreign countries, 7/3, p.45
Space development timetable, TRW
predictions, 8/7, p.31
Tysaman Machine Wks.: Simple
scheduling chart gets new product to market, 7/31, p.48

Chemical Treatment:
Budd prepares auto wheels for painting, 10/23, p.72

Chile: Expansion of mining installations,

7/3, p.19 Chromizing:
Chromizing turns 'pink' to reduce
wear, Formsprag's metal diffusion alloying process, 8/21,

Clad Metals:
Clad steel tube and rod extruded
without heat, Scotland, 8/7, p.79
Texas Instruments terms clad
metals—metalworking's \$1 bililion infant (STEEL Feature),
9/18, p.75

Three layer clad metal for steam iron soleplates, Texas Instruments, 9/4, p.27

Cladding:

Aluminum cladding is weight saving for giant aircraft, 10/16, p.14

Cladding benefits, precious metals,

8/28, p.65
Electroclad refractories, corrosion resistant, 10/9, p.58u*
Explosive cladding (Du Pont method) for interiors of nuclear reactor vessels at B&W, 10/23,

German firm clads steel via explosives, 10/9, p.31

Classroom: See Educational Mar-

Cleaning, Blasting: Peeners to work on F-111, Vacu-Blast system for General Dynamics, 8/14, p.32

Vacu-Blasting process: Prepainted steel sheet spot cleaned for welding, Inland Steel, 9/18,

Coal industry market trends, new developments, 7/10, p.92 Coke checked in making graphite,

Coke checked in making graphite, research pays off, 7/10, p.27
Converting high sulfur coal into low sulfur boiler fuel, reduces air pollution, 12/11, p.29
Total energy sought from coal reserves, research and development of Coal Assn., 12/4, p.77

Coatings: See Finishes, Coatings

Industry report, 11/6, p.25
Product guarantee spectre haunts
coil coaters, 7/3, p.38

Automatic coil winder, 8/21, p.24

Coinage: Clad metal usage, Texas Instru-ment report, 9/18, p.75

Cold Headers: See Fasteners

Cold pilgering mill at Stellite Wks. produces precision bars and pipe, 8/28, p.70*

Company Meetings: Owner-managers find solutions to their special problems (Mil-waukee businessmen) CIM meet-ings, 11/20, p.71

Company Operations:
Alcan shortents its 'pipeline,' Central Planning Dept., arranging the pieces into an integrated company, 8/14, p.54
Carborundum: Corporate planning, 9/11, p.66

How Copper Range is digging out; Boyd tells story of operations from 1959 to 1966, 10/16, p.37 Why Lindberg decided to build fur-naces: Bodden and Peterson,

10/16 p.45 ean Industries makes its move, builds rather than sell or merge (groups in company), 12/25, p.27

Company Politics:

Playing company politics is must. 10/30, p.23

Components:

Inventories, 3rd quarter, 8/7, p.109 Inventories, 4th quarter, 10/30,

Computers, Data Processing:
(See also Steel Mill Controls)
AEC photodigital system, data storing, Lawrence Radiation Lab, 11/6, p.24
Analog computer controls foundry,

p.31

8/14, p.31
Automated file systems, Lektriever for records storage and retriever, 11/6, p.70d*
Business data in large stack sent via Early Bird satellite, IBM, 8/7, p.84q*
Computer controls power and free

conveyor, Chevrolet Bay City parts plant, 11/6, p.58
Computer control of NC tape, 12/18, p.28
Computer design program (Dr. Herzog at Univ. of Mich., and Dr. Fried, TRW), 10/30, p.65
Computer graphics predicted by Harrington (Arthur D. Little), 7/31, p.15
Computer-graphics, reactive displays, 12/4, p.25
Computer operates on aircraft carrier or in a spacecraft (VIC), 7/10, p.32
Computer-order processing at

rier or in a spacecraft (V 7/10, p.32 Computer-order processing Grumman, 12/18, p.58

Computer reports employee benefits, 7/24, p.23
Computers to design buildings, pre-

diction of real estate exec, 10/23,

Computerized management infor Computerized management information system at National Twist Drill, Telecontrol shop reporting with Univac 418 real time computing, 7/17, p.73

Computer frees foremen of detail, 11/21, p.21

Computer System 70 offers complete control of NC, Freed, Bunker-Ramo claim, used at Boeing, 10/9, p.25; 10/16, p.48

Construction equipment maker's computer analyzes machine life, 7/17, p.19

Data processing system matches

Boeing, 10/9, p.25; 10/16, p.48
Construction equipment maker's
computer analyzes machine life,
7/17, p.19
Data processing system matches
workers to jobs, 7/17, p.21
EDP important to small firm,
NICB survey, 11/6, p.23
Educational computer opposed by
teacher, 9/18, p.23
Electron beam recorder picks off
computer information faster than
typewriter, 7/10, p.59
Engineers share problem solving
computer via answering service,
8/28, p.74*
Executives picked via mobility
patterns in programmed computer, 11/20, p.23
Foundries use common computer,
11/6, p.24
GE develops markets for process

GE develops markets for process control, 11/27, p.96 Holograms computer generated

Holograms computer generated from digital data, 11/27, p.23 IBM production system, computers control ferrite memory core making, 9/25, p.58 Kelvinator refrigerator, computeratied design, 7/24, p.61 Leasing computers via third party cuts rental cost, 12/4, p.23 Leasing computers, GE-Systems Capital contract, 12/11, p.32 Machine tools, computer controls forecast, 9/11, p.78 Machinability is a computer program (demonstrated by North American Rockwell's Rocketdyne Div. at college campus), 10/30, p.62 Optical scanning (OCR) optical

Optical scanning (OCR) optical character recognition, eases doc-ument bottleneck, 11/13, p.77 Punch via computer control, 7/31, (OCR) optical

Punched card bookkeeping a bo-

Punched card bookkeeping a bo-nanza for small firms, 7/3, p.42 Punched tape reader superfast, Netherlands, 12/11, p.25 Shop programming (language computer package), PDS 1020, 12/4, p.76r* Small computers-mass storage op-tion (Honeywell), 8/21, p.50d* State (Louisiana) data center, 9/18, p.25 Stock market data processing,

market data processing, /28,

8/28, p.23 Tape programmer for long, un-usual sequences, 8/28, p.72* Thermostats (dime-sized) com-puter tested, 12/25, p.16. UCLA's TranSim, distribution. com-

transportation computer, p.25

p.25 Univac linear program speeds de-cision making, Omega package, 12/4, p.76f° Warehouse (Rohr) computer con-trol, 11/6, p.61

onstruction—materials battle gets hotter (STEEL Feature and cover pic.), 7/24, p.43 168 capital spending forecasts, 10/18—75

1968 capital spending forecasts, 10/16, p.5 1968 forecast, 10/2, p.43 1968 spending forecast, 11/27, p.99 1st half slump, market trend, 8/21, p.73 See also Housing

Consumer Spending:

968 forecast by Couper, Federated Dept. Stores, 10/23, p.100 cousehold heads to get younger, NICB census, 7/31, p.14

Coolants: See Lubricants

Agreement on copper deposits, Papua-New Guinea, 12/18, p.27 Coppermetals' emerging markets,

Copper mine, Chilean, 10/23, p.32
Copper ore deposit, Sourdough,
Man., 8/21, p.21
Roller coaster pricing foreseen,
12/18, p.23
Strike effect: Some copper users
90% dependent on imports,
12/25, p.13

Copper Firm:
How Copper Range Co. is digging out: Boyd tells continuing story of firm's advance from '59 to '66, 10/16, p.37

Copper Strike: See Labor

Corporate Planning:
Corporate planning scans the
globe: Wendel, Carborundum Co., report, 9/11, p.66

Corporate Specialists:

orporate staff specialist, new breed of executive, 7/3, p.13

Corrosion:
Beryllium added to alloys, corrosion resistant for underwater hydrophones, 10/9, p.58gg*
Corrosion protection via flame spraying, 9/18, p.27
Electroclad refractories lick corrosion problems, 10/9, p.55u*
Epoxy coating, corrosion resistant for storage tankmaker, 10/9, p.60a*

p.60a*

p.60a* How welds affect corrosion, pre-treating surface before painting (Sweden), ship hulls, 8/21, p.17 Oxide films block corrosion, NBS, 8/28, p.28 Stress corrosion reduced, NASA, 8/28, p.29

Cost Analysis: Quality control uality control experts try cost-analysis elixir, 7/24, p.48

Council of Independent Managers: Owner-managers (Milwaukee) find solutions to their special prob-lems, meetings, 11/20, p.71

Cryogenic Vessels: See Pressure Vessels

Cryogenics:

Cryogenic liquid (coldsoaking) cure for stainless, 11/27, p.22 Nickel alloy puts spring into physical properties, 12/4, p.25

Customer Balance:

The is running your business—you or your customers, 9/18, p.107

Cutting, Shearing:
Automatic flame cutting does precision jobs fast, Reliance Steel, 11/20, p.102b*
Coldforg cropping tool used in cold extrusion, 8/7, p.71
Conveyor-vacuum belt stacks stainless sheets at end of shearing

less sheets at end of shearing line, 9/18, p.29
Flame cutting heavy titanium bar stock, 11/27, p.28
Scrap chopper (Wean) improves knife life, cuts noise, 8/7, p.80

Cutting Tool Industry: 1967 outlook, market trend, 7/24, p.87

D

Defense Contracts: Ohicago bank reports—top ten states get two-thirds of con-tracts, 7/24, p.85 Defense spending-1968: TRW's Wright, 12/11, p.141 Military market, how competitive? 12/18, p.79

Desalination: See Water

Acurad diecast aluminum cylinder

heads for pneumatic equipment,

7/3, p.21

AF studies ferrous diecasting, 12/25, p.14

12/25, p.14 Aluminum diecasting tip, speaker

Aluminum diecasting tip, speaker at SDE, 12/18, p. 32
Annual meeting of diecasters—a look at plastics and Canada pact, 10/9, p.58v*
Appliance makers use more zinc diecastings, 9/18, p.145
Automated diecasting process for small zinc castings, 9/18, p.31
Doehler-Jarvis transplant coating system on diecast aluminum cylinder engine, 10/23, p.19
Ferrous diecasting: Going for the home stretch, GE Lamp Metals Dept., 7/24, p.54
Ferrous diecasting tried on production parts at Wabco, 10/16, p.21

Five-cavity die machining time cut with EDM, 8/14, p.57 Hot die forging of titanium, 8/14,

p.60 p.60
Miniature diecasting via single
cavity cuts costs, Madison-Kipp
Corp., 12/11, p.94f*
Refractory dies for copper, new
development, 9/18, p.19

Diemaking:

Diemaking takes on new look with EDM machining, Mt. Vernon Die Casting, 8/14, p.57 Electroforming challenges conven-tional diemaking methods, 7/3,

Dies: See Tools & Dies

Diamonds: See Industrial Dia-

Drawing: Ultrahigh pressure aids deep draw-ing, 10/9, p.126

Drilling: NC-EDM for burrfree microholes, 7/17, p.31

Drives, Controls:

Hydrostatics: A new way to go (STEEL Feature), 9/25, p.47 SRC applications: Solid state power moves fast in metalwork-ing, 7/17, p.62

Ductile Iron:

Porous plug process cuts ductile iron costs, 11/6, p.63

Durable Goods: Industry report, 11/20, p.7 New England investment high, market report, 12/11, p.138

Dust Collectors & Filters: Dust particles removed from gas streams with rotating circular brushes, German process, 10/23,

p.27 Electrostatic precipitators for small to medium sized company dev., 12/18, p.28 Silicon diodes aid air cleaning, 10/9, p.29

E

Earnings: See Financial

Economy: See Business (Economy)

Current: See Inspection. Eddy

Campbell Called Tom, 10/23, p.17 Editorials:

p.17 Capital Spending—Where Do We Go From Here? 11/6, p.17 Capitalist evolution (USSR),

Capitalist evolution (USSR), 10/16, p.11
Costs and Prices, 7/3, p.11
Floor in the Sky (Ford settlement), 10/30, p.17
Gaging the Future (British pound sterling devaluated, etc.), 12/4,

stering devaluated, etc.), 12/4, p.17

Have A Cigar (sales pitch), 7/10, p.17

Hold Your Hats (inflation, corporate and personal surtax), 8/14,

p.17 Holiday Hopes, 12/25, p.9 'T'm All Right, Jack' (English production worker), productivity goal needed, 8/21, p.9 Let's Make It Better! 8/7, p.17

Merger Madness, 9/25, p.17
The Merger Game, 11/13, p.17
Metalworking manager: The
Squeeze is on, 11/27, p.17
More Job Exports? 9/18, p.17
New Role for Associations, 10/2,

p.13 Penalty for Proficiency (AT&T), 7/17, p.17 Pizzas, Platters, and Profits, 9/11, p.17

Plan for 1968, 9/4, p.13 Sanity Before the Crisis, 11/20,

p.17 Tool Money, 12/18, p.17 Truth in Government, 10/9, p.17 Wages and Prices, 12/11, p.17 Wanted: Better Spokesmen, 7/24,

p.17 Watch Canada, 7/31, p.11 What Price Submissiveness? 8/28, p.17

Educational Markets:

lassroom: A booming market (hardware, etc.), 9/18, p.103

Electric Motormakers: Industry report, 11/20, p.133

Electric Power: Energy use in U. S. by year 2000, 11/20, p.21 Forecast: Cryogenically refriger-

orecast: Cryogenically refriger-ated copper and aluminum elec-trical transmission lines, 9/4,

p.27
Fuel cell for Navy deep diving, 11/6, p.24
Nuclear power growth in the electrical industry (STEEL Feature), 11/13, p.51
Nuclear powerplant, Westinghouse builds for Virginia Electric, 10/23, p.31

10/23, p.31

Nuclear plants cheaper than hydroelectric power, 11/27, p.21

Silicon rectifiers more powerful,
Logic-Triac series, 9/25, p.29

Solid state power moves fast in
metalworking, SRC applications
grow, 7/17, p.62

Solid state to open home and auto
markets, Westinghouse forecast,
11/13, p.25

Storage battery delivers 500 watts
of power per pound of weight,
AEC research, 8/21, p.23

Electrical, Electronic Makers: Market trends, 10/23, p.98

Electrical Discharge: See Machining

Electrochemical: See Machining

Electrocoating: See Metal Deposi-

Electrodes: Tube mill electrode life boosted on electric resistance weld, constant pressure, 11/20, p.64
See also Welding

Electroforming: Electroforming challenges conventional diemaking methods, 7/3,

p.40
Lockheed fabricates motor cases
for solid propellent rockets:
Comparison of equipment needed
for roll and weld vs electrodeposition, 7/10, p.58

Electronic Industry: 1968 'Forecast by GE Electronic Components' Maier and Lee,

12/25, p.58
1968 outlook, 11/13, p.107
Export-imports, 1st half, 10/9, p.197

Exports outgain imports, 12/4, p.116

Electronics: Acoustic survey of San Diego bay floor, data for projects, 8/28

p.21
Basic positioning circuit for air cylinder, 8/7, p.84j*
Integrated circuits score again in NC: Bunker-Ramo IC module boards (STEEL Feature), 8/28,

Integrated circuits for lower cost processing studied by Philco-Ford, 8/14, p.27 Integrated circuits, '68 outlook and widespread use, 12/11, p.25 Microwave terminals go portable,

phone call emergency, 7/31, p.21 Microwaves pushed into more NDT areas by research, Miss Lavelle, Frankford Arsenal, 7/3, p.44

C punch press designed Acro for electronic st 11/20, p.90

Electropainting:
1968: Big year for electropainting
(GM's South Gate, Calif., lines,
Ford, Chrysler), 7/10, p.35
Electropaint entry shows promise:
Udylite's Cyclemaster installed
at GE's Salem, Va., plant, 7/10,
p.55

Electropainting equipment at Udy-lite saves floor space, 7/3, p.21

Electroplating, Plating:
Copper fluoborate plating system
deposits in recesses with high
throw system, 12/4, p.76v*
Copper plating via ultrasonic, Battelle, 12/18, p.29
Plating tips for nickel users, 7/24,

p.50 Surface conditioning pares plating rejects (Imperial Electroplating), 8/14, p.68

Electroslag Melting: See Melting

Electrostatic Precipitato See Dust Collectors, Filters

Electrostatic Spray System: See

Elevator Builders: Foresee boom coming in '69, 10/16, p.75

Employee Pay Plan: Texas Instruments puts hour workers on salary, 12/11, p.90

Profit Sharing: (Milliken): Employee Profit Sharing: Lodding Engineering (Milliken): Nothing like money to motivate people, 11/13, p.65

Employee Training: See Manpower

Engineers: Coal industry, manpower shortage, _ 7/3, p.15

7/3, p.15

Education needs cited by Hibbard, B. of M., 7/24, p.23

Engineers' new look, a professionalism, 7/17, p.21

Engineer demand, Deutsch & Sheareport, 8/21, p.15

Salaries for engineer graduates, 11/27, p.22 and 8/28, p.23

Salaries need lid: AMA speaker, 9/25, p.23

Steel recruiters of college grads compete with other industries, 9/25, p.25

Technicians, industry's needs, 9/11, Technicians, industry's needs, 9/11,

Executives: See Management

Explosives: See Forming, Bending

Exports, Imports: See Foreign Trade

Battelle studies cold extrusion, 9/25, p.31
Big titanium extrusions possible, wing panel from billet, 12/25,

p.15 Cerrobrass puts ton-a-minute ex-trusion press on stream (STEEL Feature), 11/20, p.57 Clad steel tube and rod extruded without heat, Scottish lab, 8/7,

p.79
Cold extrusion of steel, new jobs, 7/31, p.17
Cold extrusion heads for bigger parts, bigger markets (Ferry Cap and subsidiaries—National Extruded Metal Products, and North Industries), 8/7, p.70
Extrusion method coats wires with two plastics, 12/25, p.15
Hydrostatic extrusion report (AF-Battelle symposium), 11/6, p.25
Hydrostatic extrusion, market grows, 12/4, p.23

Fabricated Structurals: Market report, STEEL poll. 9/25,

Fabrication & Assembly:
Collar rivet pins solve terminal contact problem, carving knife handles, 8/7, p.78
Forging dies key factor in fabricating heavy parts, 10/9, p.127
Giant aluminum tools will 'build' superplane (Boeing 747 fuselage), 7/3, p.46
Lockheed backs out of assembly problems: Electro-forming motor cases for solid propellent rockets, 7/10, p.58
Nuclear pressure vessels, new fabricating trends, 11/13, p.55
Plastics fabricating techniques, 12/25, p.18

Plastics fab 12/25, p.18

Farm Equipment:
Agribusiness (food tools) market booms, 8/28, p.21
Agribusiness-equipment makers race against world hunger, STEEL Feature, 10/30, p.55
Electronic wizardry of year 2000, 10/16, p.15
Ford tractors-agriculture 2000, 10/16, p.15
Market trends, 10/23, p.99
Massey-Ferguson Ltd.: Farm machine maker tells some welding secrets, 9/11, p.62
Price hikes forecast by equipment makers, 9/18, p.155

Fasteners, Fastening: 2nd half, market report, 8/28, p.106

2nd hair, market report, 8/28, p.106
Aerospace fasteners, higher fatigue life, 7/31, p.48b
Aircraft and missile markets, fasteners, 12/4, p.114
Bethlehem nut-bolt plant: Black light spots flaws in fasteners, 7/10, p.64h*
Bolt-nut, self-retaining positive locking, 9/25, p.59
Boltmakers exhibit at Hanover machine tool show, 10/2, p.17
Cold header triples parts output, German firm exhibits at Hanover, 11/13, p.75
Collar rivet pins solve terminal contact problem, carving knife handles at Rival Mfg., 8/7, p.78
Fasteners made stronger via vacuum processing, Allen Mfg., 8/21, p.50

Fasteners made stronger via vacuum processing, Allen Mfg., 8/21, p.50
Fatigue testing checks aerospace fasteners, 10/9, p.60d*
Rotary quenching of fasteners provides uniform hardness, 9/18, p.88
SST wing to use rivets, fittings, 10/30, p.25
Vietnam equipment, persistent breakdowns by Lt. Gen. Bunker (Army), 7/10, p.21
Washer-dryer cleans fasteners, 9/18, p.25

'Sapphire' fiber produced in con-tinuous lengths, 10/30, p.21

Boron filaments for turbine jet engines, 10/16, p.19
Glass filament winding to produce entire airplanes, AF lab, 11/6,

p.31 Polished boron filaments stronger,

7/17, p.29
Silicon carbide filaments promise hot strength for components, 8/14, p.31

Filing: See Office Equipment

Financial:

AT&T (Scanlon): Competitive earnings a must, 7/10, p.25

Manufacturers profits, 3rd quarter (National City Bank of N. Y.), 11/27, p.21

Steel profits, 3rd quarter, 8/7, p.7

Steelmakers' profits down from year ago, 3rd quarter, 11/6, p.100

Finished Mill Products: Why imports plague aluminum firms (semifinished aluminum imports from countries listed), 7/3, p.45

Finished Steel: 1958-'68 tons shipped from service centers, 10/23, p.101 1968 shipments predicted by steel exec, 10/23, p.21

Finishes, Coatings, Paints: Aluminizing steel with dry powder, BISRA, 12/18, p.27

Aluminum paint applied to laser diodes increases light output, 10/23, p.31
Beryllium surfaces, thin protective coating, 7/24, p.27
Boeing works on fluidized bed for applying coatings to refractory alloys, three step process, 11/6, p.27
Budd's two-line painting system-features, 10/23, p.72
Electrocoating winning production line jobs, Vidalia, Ga., 11/6, p.56

line jobs, p.56 p.56
Electropaint (Cyclemaster) at GE
plant (electrophoretic deposi-

plant (electrophoretic deposi-tion), 7/10, p.55 Electropainting, big year for 1968 (artist's conception of lines in

(artist's conception of lines in GM's Southgate, Calif., plant), 7/10, p.35
Electrostatic (airless) spray for metal bedroom furniture halves paint use, 11/27, p.64
Electrostatic spray gun applies penetrant dye inspection at Norair, 11/20, p.65
Epoxy coating cuts storage tank material, corrosion resistant, 10/9, p.60a*
Glass ceramic coatings, 11/20, p.29
Jet vanes-diffusion coating, 11/6, p.27

p. 27
Organosols for coil coating and metal finishing, 11/20, p.29
Paint guarantees haunt coil coaters, 7/3, p.38
Plasma spray for applying powder coatings, Metco, 8/21, p.21
Plasma spray for itianium parts (wear resistance), 11/6, p.27
Reactive metals, protective coating (Crucible), 9/11, p.31
Silicone-based coatings for supersonic aircraft, 8/7, p.84e*
Tungsten carbide coatings pay off, Motorola application on circular saw using Ricklin Mfg. equipment, 11/6, p.55

Fire Protection:

Fire Protection:
Fire stops placed along electrical wiring, 10/23, p.24
Stainless fire extinguisher cabinet door, adhesive bond, spotwelds eliminated, 7/24, p.64f*
Undercoating fireproofs ship paint, 8/7, p.29

Flame Cutting: See Cutting, Shear-

Fluid Power Industry: 1st half shipments, market report, 8/28, p.108 Customer education via classroom, 12/18, p.78

Fluid Power Institute: Henke predicts fluidic uses, 10/30, p.27

Fluidics: See Instruments & Con-

Fordham University:

r. Hogan: Japan's an exception but troubles haunt steel in most nations, 10/16, p.13

Foreign Aid:

AID loan to Indonesia, 7/3, p.21

AID loan, Turkish firm, 8/14, p.32

Export-Import Bank loan for Jap

powerplant, 7/17, p.117

Export-Import Bank loan to Vene
zuela, 7/24, p.32

Export-Import Bank's proposed

\$50 million loan to Flat for

U. S. equipment, clamor on

Capitol Hill, 8/21, p.11

IFC loans for manufacturing

(1966-67), 10/2, p.28

World Bank loan to Yugoslavia,

7/24, p.32

World Bank loan to Republic of

7/24, p.32 World Bank loan to Republic of China, telecommunications, 8/14,

Foreign Competition: Foreign Competition:
Aluminum firms concerned with imports: 1966 semi-finished aluminum imports from (countries listed), 7/3, p.45
Cleveland World Trade speaker (Pomeranz): Struggle against nontariff barriers needs facts, 9/18, p.23
Metalworkers, world market competition, 11/27, p.56
Steel import bill (Hartke-Dirksen) in Senate, 10/16, p.14
Steel import bill (Hartke-Dirksen) deferment subject of address by

Roche (AISI), 11/20, p.21
Steel import quotas subject of addresses for Stephens (J&L) and Blough (U. S. Steel), 11/20, p.21
Steel import quota opposed by Lobb at Crucible, 12/25, p.11
Steel imports: Weidenhammer report released by Senate Finance Committee, 12/25, p.11

Foreign Investments:
Activities overseas, Booz, Allen survey, 10/23, p.32
Carborundum acquisitions, reasons for purchase (global planning), 9/11, p.69
Construction of iron and steel plants in developing countries debatable, opinion of August Thyssen-Hutte president, 12/4, p.32

p.32 irms with investments abroad, Commerce Dept., 8/14, p.25 S. firms face problems, seek-ing business overseas, 11/20,

Foreign Markets: Indonesia welcomes investors, 10/2,

D.28
Latin American market forming, economic boom, 12/25, p.16
Singapore and Malaysia encourage investments, 12/11, p.31
Swedes probe U. S. quality markets, 12/18, p.48

Foreign Trade:
Buy American legislation squeezes
governors promoting trade missions (exports for local firms);
controversy focuses on Pennsylvania, 7/24, p.19
Buyers' interest in foreign steel,
11/13, p.98
Iron Curtain countries best export
bet. 7/17, p.25

Iron Curtain countries best export bet, 7/17, p.25

Japanese electronic products to U. S., 8/21, p.21

Kennedy Round GATT talks: Impact of new reduced tariffs, 7/10, p.19

Minneapolis metal executives tour Iron Curtain countries, 8/28, p.62

p.62 Stainless steel imports 1st half, 9/25, p.21 U. S. exports to France soar, 7/10, p.27 U. S. exports shrink, 11/13, p.21 U. S. exports to Japan, '67, 8/7, p.111 U. S

p.111
S. exports to Japan, 1st half '67, 9/4, p.23
S. exports rise, 1st 6 months, Commerce report, 9/18, p.21

Foremen: Your link to labor: A changing face (STEEL Feature), 8/7, p.65

Forging Industry Assn.: 1968 forging sales forecast by E. F. Lindman, 11/27, p.99 Study in cooperation with AIA re-veals defense forging needs, 9/25, p.19

Veals detense forging needs, 9/25, p.19

Forging, Forgings:
Auto-Forge: New weapon for forger's arsenal. George Harrison, developer, 7/10, p.56
Auto plastics process, solid phase forming, 12/25, p.18
Automated oil hydraulic forging press for Jorgensen, 7/31, p.48d
Beta forging titanium, aircraft structurals, 10/9, p.126
Bliss describes forge press of the future, 11/20, p.85
Captive forger competes (Ford-Canton plant): Innovate, automate, invest, 11/20, p.83
Casting-forging process automated, 7/3, p.21
Colforg cropping tool, cold forging use, 8/7, p.70
Forging dies key factor in fabricating heavy parts, 10/9, p.127
GM-Hydramatic: Warm forging of pinion blanks, 9/11, p.29
HERForging machine, four-way (Austrian), 12/4, p.29
Hot die forging study almed at hiking titanium pote en tial (HTRI), 8/14, p.60
Pierce-forging, entry in aluminum forming, Imperial-Eastman and Alcoa, 8/14, p.29
Warm forged plastic parts (Ford), 7/17, p.21

Forming, Bending: Cold formed ABS plastics, 8/7, p.31

Cold forming unit handles big job, socket head fasteners, 8/21, p.19 Electroforming, moldmaking tech., challenges conventional diemaking methods, 7/3, p.40 Explosive form with spray gun.

Southwest Research Inst., 10/

p.15
Explosive forming missile domes with single charge at Martin, 11/20, p.102h*
Isostatic pressing research, GE, 8/28, p.28
Pierce-forging for ferming aluminum parts, 8/14, p.29
Structural foam molding, 12/25, p.19
Urethane forming makes a better.

p.19
Urethane forming makes a better
brake band at Bossert Mfg.,
8/7, p.84h*
Urethane punch for pressure forming garden tractor fenders, 8/28,
p.29

See also Stretch Forming

Foundries: Czechoslovakia: rams molding materials, 8/28,

Gazal process cuts costs of ductile

iron, 11/6, p.63
Gazal process improves iron quality porous plug system, 10/9, Gazar process ty, porous plug system, 10/2, p.5Sq* NAF meeting: Foundries face 'tough bargaining,' 10/9, p.23

Electronics-government run center, 11/6, p.27

Frankford Arsenal: Lavelle: Research pushes microwaves into more NDT areas, 7/3, p.44

Freight Cars: See Railroads

Fuel Cells: See Electric Power

dustrial gas uses, n growth, 8/14, p.29 and p.19 Industrial

p.19 Liquid methane gas tankers built; storage in ground in deep holes, 9/11, p.29 Oil industry faced with problem of supplying low sulfur content fuel oil, 12/11, p.139

Furnaces, Ovens Heating, Heat Treating:
Annealing furnace combines steps for quality, speed (Dayton Malleable Iron), 8/7, p.77
Billet furnace rebuilt while still operating, 7/10, p.62
Crucible automates bar heat treat furnace, 11/6, p.57
Electroslag melting furnaces for large ingots, 7/31, p.41
Gas-fired hump furnace used for hydrogen atmosphere brazing, 9/25, p.60
Gas-fired slot furnace at Ford's Canton forge plant, 11/20, p.89
Lindberg furnaces in operations, 10/16, p.44
Rotary hearth, wheel block furnaces replace box furnaces at Homestead Wks., 8/28, p.74*
Vacuum furnace continuously carburizes refractory metals, 12/11, p.94a*

Bendix speeds x-ray gaging, Shef-field Measuray series, 11/27, p.69

Imports vie for gaging market,

7/3, p.17

Master gage accuracy with Tim-ken's precision taper measuring unit, 7/3, p.21

Galvanizing:

Hot dip galvanizing, coat on fabricated iron and steel, future markets forecast, 9/11, p.112

Gearmakers:
4th quarter outlook, 11/9, p.110
AGMA group learns about Jap
practice, 12/11, p.94c*
Cold drawn carbon steel, economy
in gearmaking, 12/11, p.94b*
Ford saves 1½ cents per piece
with rolled vs shaved gears

(Landis Machine TRF gear rolling machine), 9/11, p.71

Germany (West): Computer usage forecast, 12/25,

Computer usage p.16 Krupp uses electrolytic grinding, 12/18, p.56f*
Steel industry employment cuts, 9/18, p.32

eel producers merge, The and Oberhausen, 9/25, p.32

Global Planning: Carborundum's planning, acquisitions and reasons for purchase, 9/11, p.69

Government:

Antitrust:
Merger guidelines dev. 12/18,

Supreme Court ruling: Proctor & Gamble merger with Clorox, impact on other mergers, 11/20,

p.21
Auto safety agency's calendar, car occupant protection, vehicle lighting top priority, research contracts, 8/14, p.35
Auto safety bill, limited exemption endorsed by Haddon, 9/11, p.76
Auto safety proposals for 1970-'71 models, 10/30, p.34
Auto safety (AHRSC): Vehicle inspection mandatory? 12/4, p.35
Buy American legislation puts state governors in the middle, 7/24, p.19
Buy American—Jap Trade Council

7/24, p.19
Buy American—Jap Trade Council argues law, 11/27, p.21
Chamber of Commerce asks campaign contribution limits for labor unions similar as for corporation, 7/31, p.14
Financing Flat, Export-Import loan, blocked by Senate, 8/21, p.11

p.11
Grand Coulee Dam, Russian bid ruled out, 7/24, p.21
Hew (Gardner): Systems approach for clean air and water projects, 9/4, p.S-12
Import quota bills in hands of Senate Finance Committee, 10/30, p.21
Steel import gu

Steel import quota bill introduced by Hartke and Dirksen, 10/16, p.14

p.14
Steel import bill, Weidenhammer report released, 12/25, p.11
Technology assessment urged by Rep. Daddario, 7/24, p.27
Truth in Lending program (interest rates, etc.), 10/9, p.17

Graphics: See Computers

Graphite: Coke selection for making graphite, research pays off, 7/10, p.27

Gray & Ductile Iron Founders' So-

ciety: 1st half shipments, 9/11, p.112 Industry report, T. J. Warden, 10/30, p.104

Great Britain:
Automakers relaxed payment restrictions, 7/17, p.27
British seek process control lead, 10/30, p.32
Capital outlays to fall, 7/10, p.27
Devaluating pound, hope for world market, 11/27, p.19
Devaluating pound, effect felt by U. S. tool builders, 12/11, p.7
Ports may be nationalized, 7/24, p.32
UK trying to stop brain drain, 9/25, p.32

Grinding, Polishing:
Diamond grinding wheel protected
by moisture control at Norton,
11/27, p.62
Diamond wheel dry grinds vanadium, Japanese report, 9/25,
p.57

p.57
Electrolytic grinding (rough grinding the "Christmas tree root" of turbine blades and buckets, 10/2, p.15
Electrolytic grinding, Krupp Works, 12/18, p.56d*
Electropolishing tungsten wire removes surface defects, 7/10, p.31

p.31 Gibson Machine combines production and toolroom grinding, 9/18, p.126f*

Grinding wheels, more power, 7/31, p.22
ID grinder handles big parts, 12/11, p.27
Japanese roll grinder takes on largest sizes, 12/4, p.73
NC cylindrical grinding, German firm exhibit at Hanover Fair, 12/4, p.69

Guarantees: See Coil Coaters

H

Hanover Machine Tool Show:
Battle for World market takes shape, 10/2, p.15
Cold heading machines, boltmaker exhibit, 10/2, p.17
Cold header triples parts output, German firm, 11/13, p.75
Electric upsetter demonstrated by Germans, 10/30, p.67
NC displays, 9/25, p.19
NC cylindrical grinding, German firm sees payoff, 12/4, p.69
Sophistication of foreign machines proved at show, 10/23, p.66

Health & Education:

Noise presents employee in-efficiency, Public Health finding, 12/11, p.29 Public problem markets (Impact Issue), 9/4, p.S-17

Heat Treat Shop: Inertia welding equipment via job shop, 9/18, p.99

Heat Treating & Annealing: Aluminum sheet rides on air through horizontal furnace, Kaiser's continuous heat treat

Kaiser's continuous heat treat line, 10/2, p.25
Annealing furnace (Dayton Malleable Iron) combines steps for quality, speed, 8/7, p.77
Automates bar heat treating facility at Crucible, 11/6, p.57
Automatic heat treat plant in New Zealand lab, 7/31, p.48b
Black plate annealing process, BISRA, 10/16, p.17
GE miniature strand annealing furnace duplicates steel mill, Pittsburgh lab, 10/23, p.31

ell Lab, more depth for holograms, 10/23, p.27

Housing:
Calif. pushes steel homes, 11/13, p.23
Home building market, 10/23, p.5
J&L mobile home, prices cut with
modular approach, 9/25, p.23
Planned community for homes for
coal miners, W. Va., 9/18, p.21
Plastics in building applications,
market trend, 7/24, p.84
Urban development, new thinking
in housing, 9/4, p.S-8

Bathtub plant on market, 8/28,

Hydra-Matics: GM's second tech center, Hydra-Matic Div. (STEEL Feature), 7/3, p.33

Hydraulics:Hydraulic piston improved, Italy, 10/2, p.27

Hydrostatics: Hydrostatic drives: A new way to go (STEEL Feature), 9/25, p.47

Industry report by speakers at symposium (Air Force Lab and Battelle), 11/6, p.25

HT Research Institute:
Hot die forging study (AF Materials Lab) aimed at hiking titanium potential, 8/14, p.60
Transit mode through a Coanda, nozzle studied by Imants Reba, 9/11, n.29. 9/11, p.29

Impact Issue:
A trillion dollar era begins, public problem markets, 9/4, p.37

Imports: See Foreign Trade

Industrial Diamonds: Damp diamonds are nobody's friend (moisture control at Norton), 11/27, p.62

Synthetic diamond output doubles,

11/20, p.27

Industrial Gas: See Gas

Industrial Heating Equipment: Market report, 9/4, p.91 Market trend, new orders first nine months, 11/13, p.106

Industrial Production Index: RB estimates manufacturing capacity, 10/30, p.7

Industrial Relations:

Field grows, student graduates (U. of Mich. report), 9/11, p.23

Industrial Robots:

Unimation licenses robots built for Europe, 7/3, p.19

Innovation:

Innovation:
Captive forger competes, innovate, automate, invest: Ford-Canton plant, 11/20, p.83
Do you adopt to new ideas or processes: Professors at Wisconsin School of Business, 8/14,

Innovations challenge aerospace industry, Boeing developments, industry, E 10/16, p.49

Inspection, Testing:
Atomic absorption spectrophotometer analyzes trace elements in roller bearings, 12/18, p.56a*
Atomic absorption spectrophotometers (Sylvania) spell speed and precision, 12/11, p.82
Automated penetrant dye inspection system (Turco) checks aluminum extrusions, sheets at Norair, 11/20, p.65
Busmuth checks inside diameters (rifle barrel, etc.), 8/21, p.19
Dosimeter dev. by Physics International for material testing, 11/13, p.31

ternational for material testing, 11/13, p.31

Eddy current tester handles hot metals, 7/24, p.51

Electromagnetic test for braze, NASA, 11/27, p.27

Electron microscope at U. S. Steel studies microstructures, 9/11, p.25

testing system

Fatigue testing system checks aerospace fasteners, 10/9, p.60d* Microwave spectrometers in chemical labs forecast, 11/20, p.31 Nondestructive test-metallic surfaces, AF lab uses back-emission electron radiograph, 11/6,

p.27

NTD conference report: Research
pushes microwaves into more
DTD areas (Theresa Lavelle,
Frankford Arsenal), 7/3, p.44

NDT, optical inspection tools,
market trend, 7/31, p.72

Portable metal analyzer utilizes
x-ray fluorescence principle,
9/4 p.10

x-ray 9/4, p.19

9/4, p.19
Surface analyses with new secondary electron spectroscopy dev. by GE's Dr. Harris, 8/21, p.50f*
Surface analyzer does many jobs, 12/18, p.29
See also Ultrasonics

Instrument Society of America: Conference speakers: Automation, fluidics, 9/18, p.21

Instrument Industry:
British devaluation of pound felt
by industry, 12/11, p.23
Instrumentation pinpoints heat
treat cycles, market report,

treat cycles, 11/20, p.132

Instruments: See Inspection, Test-

Instruments & Controls: Army unit gets fluidic control, liquid rather than air, 12/4

Boeing works on fluidized bed for

applying coatings to refractory alloys, 11/6, p.27 Fluidic digital shaft encoder, ma-chine tool slideway, 7/17, p.31 Fluidics control helicopter, 7/24,

Fluids amplifier controlled by beads of liquid, 11/27, p.23
Fluidics control ships, 9/25, p.32
Fluidics guide turret lathes at Bardons & Oliver, 7/17, p.29
Fluidics system new, tried for adaptive control task, 9/18, p.126b.2

p 126h*

Fluidics, seamless tubing seen, 10/2, p.23 Fluidics test nuclear weapons,

Fluidics test nuclear weapons, 10/23, p.27

Fluidic devices reported at IEEE conference, 10/30, p.27

Interferometer charts surface velocity under compact, laser frequency, 10/23, p.25

Oculomotor system (Honeywell) may control machines by motion of ave 8/14 p.27

may control materines by infoton of eye, 8/14, p.27

Process control installing, shielding advised for computers, instruments, 8/7, p.84k*

Thermal fluidic switching, Penn State Univ. report, 8/28, p.25

Insulation:
Elastic ceramic good insulator,
11/13, p.25

Integrated Circuits: See Electronics

Inventories:

Components, 3rd quarter, p.109 8/7.

Components, 4th quarter, 10/30, p. 103 Durable goods falling until year-end, market trends, 8/21, p.72 Metalworking windup starting,

Metalworking 12/4, p.7 Steel mill products, 3rd quarter, 9/4, p.89

Iron Ore:
Jumbo ore carrier to use new Poe Lock, 10/30, p.21
Pelletizing iron pyrite ore, Jap method, 12/18, p.23
Saudi Arabia ore find, 12/25, p.16 also Shipping

J

Japan:
Argentine trade, 12/4, p.32
Becomes No. 2 in world auto output, 11/13, p.107
Fuji Iron-Muroran Wks., continuous casting system, 9/4, p.68b*
Gear plant practice viewed by AGMA group, 12/11, p.94e*
Hitachi Ltd. claims Sendzimir rolls made with steel ups life, 7/10, p.31
Japanese try value engineering too (seminars by Raytheon's Sherwin), 8/7, p.73
Kawansaki's Mizushima Works: New facility boosts crude steel production, computer controlled, 8/14, p.72

production, computer controlled, 8/14, p.72

Kawasawi Steel, Chiba Wks., electrotinning line, 9/4, p.21

Kobe Steel Wks. opens seamless tube mill, 8/21, p.19

Kowa Seiko, pelletizing pyrite ore, 12/18, p.23

Merger of IHI and Kure Shipbuilding, 10/30, p.32

Steel industry and economy expanding: Fr. Hogan, economist speaker, 10/16, p.13

Steel production climbs, federation report, 9/11, p.32

Steelmen use spacesuits, refractory relining, 10/23, p.32

Toshiba Machine Co. Ltd.: NC grinder handles mill rolls, 11/20, p.31

p.31 Washers, solid state motor con-trol, 8/7, p.29 Yawata Iron & Steel, roll grinder takes on largest sizes, 12/4, p.73

Fixtures:

Building aircraft prototypes, laser aligner may displace jigs, 7/10,

p.29 iant aluminum tools features of assembly jigs and fixtures for fuselage of Boeing's 747 superplane, 7/3, p.46 g hole positioning, measuring system, 7/10, p.64

Job Advertising: NICB index of help wanted advertising, 9/4, p.15

Job Shops:
Inertia welding via the job shop route, 9/18, p.99
NC punch press for electronics suppliers, 11/20, p.90
National Twist Drill and Telecontrol: Computerized management information system, 7/17, p.73
Short run job shop gets automatic machining with Bullard's Templa-Turn, 7/3, p.21

Joining: 100,000 lb autoclave bonds adhesives, 11/13, p.29 Adhesive bonding stainless steel fire extinguisher cabinet doors, spotwelds p.64f* eliminated,

Adhesive epoxy for repairing aircraft bullet holes, 8/28, p.29
Adhesive metering system, 8/28,

p.64 Adhesive (Isopox) bonds below zero, 11/20, p.27 Aluminum welded to steel, 8/7,

Basic refractory bonding, low cost

Basic refractory bonding, low cost phosphate dev. by Republic, 8/14, p.99
Braze tested electromagnetically by NASA, 11/27, p.27
Brazed stainless for aircraft fittings, Douglas, 11/6, p.60
Brazing concentricity illustrated, 12/18, p.47
Brazing small microwave components with lamp, 9/11, p.31
Diffusion bonding whips special joint problems, aerospace use, 7/10, p.61
Furnace brazing seals blood cell washer joints, 10/30, p.72a*
Indium solder means safe joints, 11/20, p.29

11/20. p.29

11/20, p.29
Linde: Groove welder for joining thick plates, 11/13, p.73
Primer for bonding metal parts speeds cure of anaerobic adhesives (Loctite), 8/14, p.61
Silver plating helps diffusion bonds

between dissimilar metals, 8/7,

Slurry bonds reactive metals, 8/21, p.17 Stainless brazing debuts for air-craft fittings at Douglas, 11/6,

Thermocompression bonder, weld-

ing tips, 8/28, p.29
Vacuum brazing combined with gas quench for leakproof aluminum containers, 8/7, p.27

Kaiser Engineers Report: L-D oxygen steel production top openhearth in 1970, 8/ Steel.....

p.31
Steel mill products used by seven
Western states, 7/10, p.81
U. S.-Japan vying for BOF leadership, 10/9, p.23

Kiplinger Report:

Poverty programs need community push, creating new markets, 11/13, p.21

Labor:
Article (STEEL Feature): The foreman, your link to labor—a changing face, 8/7, p.65
AFL-CIO computer collects data on firms, 7/17, p.27
AFL-CIO wants pension fund law,

11/13, p.25 Campaign contribution limits

Campaign contribution limits for labor similar as for corporations sought by Chamber of Commerce, 7/31, p.14
Coalition bargaining downfall predicted by GE Hilbert, 11/6, p.23
Collective bargaining similar to Taft-Hartley: GE-Virgil Day, 11/27 p.22

Taft-Hartley: GE-Virgil Day, 11/27, p.22 opper pact may cause strife, no distinction between open pit and underground mining conditions,

underground mining conditions, 12/4, p.21
Copper talks, coalition bargaining, 7/24, p.19
Copper waiting for auto talks? 8/21, p.13
Copper strike concern, Sec'y Wirtz, 9/11, p.21
Copper strike, strain beginning to show (industry experts give reasons), 9/18, p.19

Copper talks, lessons for steel, 11/13, p.19
Copper str.ke. 'company-wide'

topper strike, 'company-wide' bargaining issue stalls talks, 10/30, p.19

AM local at Burbank (machinists) study aerospace optional pact, 11/27, p.70

abor law suggestions, Harshaw (Kewanee Oil Co.), 9/4, p.19

abor pacts need hard sell, why members reject contracts, 11/27, p.19

members reject contracts, 11/27, p.19
Labor settlements, 3rd quarter of '67 (wage increases for all industries), 10/23, p.21
NLRB election, employee vote, 7/10, p.25
Skilled Trades (ISST) files for representation, auto plants, 7/10, p.19
Skilled Trades petition dismissed by NLRB, 8/7, p.21
Steel haulers, impact after pact, 10/16, p.13
UAW-Big Three automakers meet July 10, issues pending, 7/3,

10, issues pending,

July 10, issues pending, 7/3, p.25
UAW: Reuther discusses a 6% package, profit sharing, blue-collar worker, 7/17, p.19
UAW-auto talks: Pessimism, proposals, 7/31, p.14
UAW-industry negotiators: Can autodom hurdle local issues? 8/21, p.11
UAW: Suppliers blink at autos' first offer, 9/4, p.15
UAW may hike strike fund ante, 10/2, p.21
UAW-auto settlement, spur to inflation, 10/30, p.19
UAW-auto settlement: Spur to inflation, bow cost factors break out, 10/30, p.19
UAW-chrysler agreement, salary gains, 12/4, p.21
UAW-Ford settlement: The great compromise, 10/30, p.70
UAW-Ford settlement: The great compromise, 10/30, p.70
UAW-Ford strike impact on auto output, 11/27, p.30
UAW-GM local issues dwindle, 10/16, p.15
UAW-GM: Automation—issue or

UAW-GM local issues dwindle, 10/16, p.15
UAW-GM: Automation—issue or 'smoke screen', pic of UAW's Woodcock, 12/11, p.43
UAW-GM, arbitration point for worker dislocation due to automation, 12/25, p.12
USWA workers slow to pick up early retirement option, 7/24, p.21
USWA-Germano addresse Chicago district delegates, outlines

USWA-Germano addresses Chi-cago district delegates, outlines demands, 11/6, p.21 USWA-Abel, AFL-CIO convention, Fla.: Local issues scuttle arbi-tration, 12/11, p.19

Labor Costs:

Labor Costs:
Auto settlement: How cost factors break out, 10/30, p.19
Cost of labor in manufacturing, 7/31, p.5
Wage and benefit package increases spiral, Dept. of Labor statistics, 11/13, p.23
Robertson (economist): No relief in '68 from wage-price spiral, 10/9, p.7

10/9, p.7
Toolbuilders price for tomorrow's labor costs, 7/17, p.119

Aluminum paint applied to laser diodes, 10/23, p.31
Ball of light for laser pumping, 12/4, p.25

12/4, p.25
Building aircraft prototypes, laser aligner may displace jigs, 7/10.

Carbon dioxide laser coupled with oxygen jet cuts metal, 9/18, p.126d*

p.126d* Gas ion laser, IBM, 7/24, p.29 Green light laser penetrates under-sea, 7/17, p.31 Laser for chemical analysis, 9/18,

p.31 p.31
Laser to cut data storage expense (Dr. Di Chen), 11/20. p.25
Laser lab can be rented at Westinghouse, 8/21, p.50d*
Laser system has three functions, AF testing, 11/27, p.23
Magnet controls laser beam, 7/10, p.21

Microvaporizer laser applied to spectrographic analysis, 8/28.

estimates laser market by

1970, 7/3, p.22 X-ray laser possible, 8/7, p.25 See also Welding

Leasing: See Computers

Lehigh University: Dr. Libsch: Role of hydrostatic extrusion grows, 12/4, p.23

Lubricants, Lubrication:
A look at lubricants (visual evaluation) via color contour mapuation) via color contour mapping may lead to better design of gears and bearings (Monsanto), 11/6, p.67

Are you using the best lubricant (chart): Select forming lubrication, Magnus Chemical), 10/16, p.41

Article: Lube engineers see some breakthroughs, 7/10, p.49

Centralized lubrication system for Inland's straddle carriers (hot steel coils), 8/14, p.72h*

Corrosion in coolant system solved by stainless steel, reactors, 11/13, p.54

Cutting oil four-in-one eliminates downtime, Selas Corp., 11/27, p.70b*

p.705**
Hard wax lubricates, protects small arms, Naval Research, 10/30, p.29 Hardness of substrate metal af-fects performance of lubricants,

1, p.31 studies high temp.

as metalworking lubricants, 9/11, p.31 and p.82h* inc stearate soap lube in zinc phosphating (cold extrusion),

phosphating 8/7, n 71

MIND: See Training

Machine Design:

ritish research indicates hyp-notism aids machine design, photogrammetric plotter test ma-chine, 8/28, p.21

Machine Tool Industry:
British devaluate pound, felt in
U. S. industry, 12/11, p.7
British toolmaker seeks U. S.
market (Stavely), 10/23, p.32 British innovation program, 11/6,

p.32
Builders' surveyed on tomorrow's labor costs and tool prices, 7/17, p.119
Computer control next as contender among technologies, Cross report, 9/11, p.78
Computerized tools studied, 12/11, p.21

Editorial: More job exports? 9/18,

Foreign-domestic tool mergers?

ow a market determined a machine: Cincinnati Lathe & Tool Co. research team, 12/11, p.84 Imports 1st quarter, five countries, 7/17, p.27

7/17, p.27 Order cancellations high, 12/11,

p.9 rofile milling machine capacity falls behind: AIA survey, 10/9,

Profiler shortage hits firms hard, aerospace industry, 10/9, p.58aa* See also Hanover Machine Tool

Machine Tools & Attachments:
Bullard's Templa-Turn for short
run job shop, 7/3, p.21
Copy milling machines with Bendix Directapath controls for
Douglas Aircraft, 11/27, p.20
Fluidics guide turret lathes, 7/17,
p.29

p.29
Hydraulic tracer lathe machines steel knuckles for steering drive axles, 7/3, p.22
Shaft turning machine via NC,

Shaft turning machine 11/20, p.21

Threading operations on Lo-Swing lathe has rolling attach-ment, 8/21, p.50a*

Tracing attachment on internal grinders, Heald, 10/23, p.74f*

Machining:

cutoff machines, Tysa-Abrasive cutoff machines, Tysa-man, 7/31, p.48 Adaptive controllers narrow sen-sor search, 10/16, p.43

Automated line turns out auto brake parts, 12/4, p.76k* Batch manufacturing: British sys-tem cuts machining labor costs, small parts, 11/20, p.62 Electrochemical machining pays

Electrochemical machining pays off for Sundstrand, cylinder blocks for aircraft engines, 12/11, p.94h*
EDM machining used at Mt. Vernon Die Casting, 8/14, p.57
Electric upsetter (German) turns out auto suspension bars, 10/30, p.67
Electrolytic

out auto suspension bars, 10/30, p.67
Electrolytic grinding, Krupp Works, 12/18, p.56d*
Face mill cuts cheap, clean swath (PERA-England), 10/16, p.47
Heald's tri-way machine combines operations on complex flanges, 8/7, p.79
Hydramatic, expanded role for ECM, 7/3, p.34
Hydraulic tracer lathe, fast machining steel knuckles, 7/3, p.22
Jigmil-tape control (printing press side frames), 8/21, p.50h*
Jigmil-tape control (large cast iron and steel speed reducer gearboxes), 10/23, p.74k*
Lockheed will hog 8 parts on milling machine (AF C-5A jet wing flaps), 9/18, p.105
Machinability is a computer program (Rocketdyne demonstrates at Campus Engineering Conference, 10/30, p.62
Mechanical broaching system tried at Ford (gear ring), 11/13, p.29
NC cylinderical grinding, German firm, 12/4, p.69
Rotary transfer, gang mill for slots in turbine blades, 8/28, p.29
Secondary machining expands P/M

Secondary machining expands P/M application, Symmeo Inc., 9/11, p.61

p.61
Thread whirling precision ball screws, 8/28, p.61
Ultrasonic machining, U. K. Atomic Energy Authority, England, 11/20, p.25
See also Numerical Controls

Electromagnet rams foundry molding materials, Czech, 8/28, p.29 Magnet line traps iron particles or scale contaminants 12/18, p.47

p.47
Magnetic handler-conveyor system
cleans scrap for detinning,
12/25, p.31
Magnetic racks added to overhead
conveyor, 8/21, p.50a*
Magnetics used in air and pollution control, new ideas at Eriez
forum, 10/9, p.27

Billet furnace rebuilt while still operating, 7/10, p.62

Jet aircraft maintenance, EB welder adds space touch, 12/4,

Management:

Management:
Big programs key to future management: Computer, systems approach, etc., 7/3, p.14
Business instruction, where needed: Dun & Bradstreet survey, 7/3, p.15
Company loyalty, new breed of management, 8/7, p.23
Corporate specialist, new breed of executive, 7/3, p.13
Council of Independent Managers (CIM): Milwaukee businessmen meet to solve their special

council of Independent Managers (CIM): Milwaukee businessmen meet to solve their special problems, 11/20, p.71
Designers, management share same problems, merging functions demanded by today's huge contracts, 7/31, p.47
Executive demand, Heidrick & Struggles, defense engineering and manufacturing 7/31.

Struggles, defense engineering and manufacturing, 7/31, p.15
Executive recruiting, guidelines on role of wife, 12/11, p.23
Foreman: Your link to labor, a changing face (STEEL Feature), 8/7, p.85

changing face (STEEL Feature), 8/7, p.65
Grooming your successor, tomorrow's manager (STEEL Feature), 12/11, p.77
Lockheed, how to grow more managers, 7/24, p.64b*
Manager training and developing, estimated cost (U. of Mich.), 8/14, p.19
Management scientists enrich decision making, Union Carbide, 11/27, p.57

Managers must be moved before they get bored, Prof. Jennings study, 9/4, p.19
Negro supervisor, an industry look, 10/23, p.53
Playing company politics a must for managers, 10/30, p.23
Product managers. controversial go-getters (STEEL Feature), 8/21, p.41
Skilled managers a minority, 10/23, p.24

10/23, p.24

Management Systems:
How NC will shuffle management functions: Harrington, Arthur D. Little Inc., report, 9/11, p.75
National Twist Drill, management computer system, 7/17, p.73
Punched card bookkeeping, data management bonanza for small firms. 7/2 n42

7/3, p.42

Managers Planbook: (STEEL Feature), a forecast for metalworking managers, 10/2,

Manpower:

Manpower:

American young men seek jobs abroad, 12/4, p.32

Ghetto employment, guidelines for businessmen, 12/18, p.23

Inmates (federal prisoners) employed at Heli-Coil, prove their worth, 11/20, p.98b*

Matching workers to jobs, data processing, 7/17, p.21

NAM program aids industry: STEP (solutions to employment problems), 9/18, p.97

NAM program, stepping stone to skilled jobs: MIND (trainees listen to recorded math), 8/14, p.58

Manufacturing Technology: International conference meet in Ann Arbor, 9/25, p.56

Marketing: Alcoa's flying showcase for grocery chain and supermarket executives, packaging exhibit, 8/14,

p.25
Computers in marketing: Promises or real payoff? 10/9, p.196
Metalmen spend less on 'cost of selling,' 10/30, p.27
Managers' handbook (feature), where are your (markets? (chart), 10/2, p.52

Material Engineers: Dr. Hibbard (B. of Mines) urges reclamation and reuse of mate-rials, 7/3, p.15

Material Handling Equipment:

Conveyors:
Chevrolet moves axle subassemblies on dual carriers, 12/4, p. 76d*

p. 76d* Large plates and beams moved at shipbuilding facility, 12/4, p.76s* Magnetic racks added to overhead conveyors, 8/21, p.50a* Vacuum belt conveyor stacks stain-

less sheets on shearing line, 9/18, p.29

Cranes, Hoists: Bucyrus-Erie installs hoisting unit on hydraulic crane, controlled free fall, 12/11, p.94b*

Storage:

Automated storage speeds produc-tion: Triax system at Worcester Valve, 8/7, p.74

Truck (Gas & Electric): Straddle carriers (Inland hot steel coils) use special lube system, 8/14, p.72h

Material Handling Institute: Kuethe: Market trends, 7/3, p.72

Materials: In Construction—materials battle gets hotter, STEEL Feature, 7/24, p.43

Materials Systems: Clad metal materials systems at Texas Instruments, 9/18, p.75

Medical: See Health & Education

Mellon Institute: Electroslag melting report, 7/31, p.39 and 8/14, p.23

Electroslag melting (STEEL Fea-ture) for large ingots, Hopkins process licensed, producers, 7/31,

Electroslag remelted metals mariectroslag remetted metals mar-ket, report at international symposium cosponsored by Mel-lon and Wright Patterson AF lab, 8/14, p.23 rie Forge melt shop payoff, 7/24,

p.64d*

Hot melt adhesives, thermal stability for structurals 10/23, p.24

Carborundums acquisitions, 9/11. p.69 Editorial: Merger madness, 9/25,

p.17
Editorial: The Merger Game,
11/13, p.17
Impact of Supreme Court ruling
on merger of Proctor & Gamble
with Clorox, 11/20, p.21
Machine tool firms, merger target,
9/11, p.19

Machine tool firms, merger target, 9/11, p.19
Merge or be merged: Healy (Price Waterhouse), 7/3, p.13
Merger guidelines dev. by Justice Dept., Antitrust, 12/18, p.19
Merger activity up, Chicago consultant report, 7/24, p.23
Rumors confirmed for combination of Pittsburgh Steel, Interlake and Wheeling, 10/9, p.21

Metal Deposition:

Electrocoating (or electrophoretic deposition) winning more production line jobs (one is Federal Pacific in Vidalia, Ga.), 11/6,

p.56
Lockheed's electrodeposition of motor cases for solid propellent rockets, 7/10, p.58
Metalliding (GE surface coating tech.), electrolytic diffusion process, 7/3, p.37
Vacuum metal deposition uses zirconium diboride, plasma spray on tantalum, 10/30, p.31

Metal Diffusion: Chromizing, diffusion alloying tech., turns 'pink.' produces sur-face hardness, 8/21, p.48 GE's new surface coating tech., electrolytic diffusion process, 7/3, p.37

Metal Finishing:
Organosols for coil coating and
metal finishing, 11/29, p.29
Superfinishing (mirror bright) may
be too costly, 8/21, p.17
See also Finishes, Coatings, Paints

Metal Identification:
Ferretmeter identifies metals,
11/27, p.64
NBS develops metal identification
tags, fingerprinting, 8/14, p.72g

Metal Selector: 1967 edition, insert, 10/9, p.77

Metal Treating Institute: Market trends, metal treaters, cope with problems of success, 7/31,

Metallurgy: Aluminum silicate whiskers for composites, 9/4, p.25 Ausformed steel, Ford, 10/9,

Austormen steel, Ford, 10/9, p.59m*
British find simple fatigue test in magnetic alloys, 11/27, p.22
Cold work experiments, physical properties of carbon steels, Case-Reserve, 8/7, p.29
Metal yield strength increased by explosive hardening, 12/4, p.29
Study of embrittlement in alloy, speaker at ASTM, 10/9, p.25
Trip steel, U. of Calif. researchers: Promise for tougher structural materials, 8/14, p.62
Trip steel: The metal that repairs itself, U. of Calif. research, 10/9, p.73

Metals: Clad metals: Metalworking's \$1 billion infant, 9/18, p.75

Decorative metals via machine.

Metals: Core of nuclear power growth, 11/13, p.51
Specialty metals, growth potential outlined by Amax president, 12/18, p.29

Metalworking:

1967 sales outlook, 10/23, p.99 1967-1966 sales and profits, first 9 mo., chart, 11/6, p.6 and 11/27, p.99
1968: What metalworking managers expect, 11/27, p.49
World metalmen eye technology,
Ann Arbor conference, 9/25,

Metric System: Commerce urges study of metric system, 11/20, p.23

Mexico: Ingot production, 1st nine months, 11/27, p.28 Steel plant project opposed by rural group, 10/9, p.23; dispute ends, 11/27, p.28

Michigan State University:
Prof. Jennings: Best managers get
bored quickly, 9/4, p.19
Jennings predicts executives to be
picked, computer mobility patterns, 11/20, p.23
Microwave: See Electronics

Midwest Research Institute: Dr. Kimball: Pollution, a systems response, 8/7, p.23

Minerals:
Mineral production rises, Bureau of Mines, 10/23, p.21
Satellite photos mineral deposits, pic. 8/14, p.29
Satellite photos spot mineral deposit areas: Dr. Abdel-Gawad, geologist, 9/4, p.68a*

Molding Machines: Automated units boost output of timer cam, auto switch cases, 11/13, p.84

Motion Pictures:

Timken movie, pizzas and plat-ters (business-economic system),

orticle: Nothing like money to motivate people; Milliken, Lod-ding Engineering Corp., report, 11/13, p.65

Association of Metal Finishers:

Springer outlines three hurdles in 1968, 12/25, p.56

National

ational Aeronautics & Space Council: r. Welsh: Built-in duplication in space research justifiable, 9/18,

r. Welsh: Money for space projects needed during '70s, 9/11, Quiet jet engine-study, 7/24, p.27

National Association of Manufac-

turers:
MIND: Stepping stone to skilled
jobs, trainee classes, 8/14, p.58
STEP: Solutions to employment
problems, 9/18, p.97

National Association of Purchasing Agents:
Business activity pickup, 9/11,

Business activity pickup, 9/11, p.19
Meeting speakers: Impact of copper strike, 12/11, p.23 and '68 outlook, 12/11, p.19
Raftery advises PAs to become more management conscious, 8/14, p.97

National Bureau of Standards:
Automated index computer for R&D projects sponsored by government, 9/11, p.31
Designs a precision piston gage for measuring pressures up to 26,000 bars, 10/30, p.31

Oxide films block corrosion, 8/28,

Superthin films useful to physicists studying atomic structures, 9/4, p.25

National Coal Coaters Assn.: Lott elected president; industry prediction, 11/6, p.25 Paint product guarantees, issue at meeting, 7/3, p.38

National Foreign Trade Council: MacGregor (speaker): U. S. needs another Materials Policy Com-mission, 11/13, p.23

Industrial Conference Board:

Board: 1968 business forecast, 10/9, p.21 EDP important to small firm, survey, 11/6, p.23 Household heads to get younger, 1975 consumer spending outlook, 7/31, p.14 Index of help wanted advertising, 9/4 n.15

9/4, p.15
World hunger, Agribusiness a multibillion dollar enterprise, 10/30,

National Machine Tool Builders'

Assn.: 7% tax restoration, orders turn up, 8/7, p.19

up, 8/1, p.19

Annual meeting at Grand Bahama (work for supper—staff on strike), 11/6, p.19

Awards winners for: Assessment

wards winners for: Assessment of capital equipment advertis-ing, 10/30, p.61 ray: British devaluation of pound to affect U. S. tool-builders, 12/11, p.7

National Science Foundation: Riley: Spending by U. S. on re-search and development, 8/14,

Navy:
Assault craft rides on air cushion over land and sea, 12/11, p.25
NC used at shipyard, Mare Island, 12/11, p.94g*
Ocean exploration, submergence vehicle DSSV planned for '70s, 8/7, p.32
Plastic structures in new surface and submerged craft, 7/17, p.67

8/7, p.32
Plastic structures in new surface and submerged craft, 7/17, p.67
Proposals for deep diving fuel cell, 11/6, p.24
Zero temp. fine copper via magnetism, 7/17, p.29

York Society of Security

Analysts: Armco's Verity speaker: Optimism for steel production in '68, 12/25, p.12

New Zealand:

contracts signed for steel indus-try based on deposits of iron sands south of Auckland, 10/30,

Nickel:

Canadian production rises, 12/18, p.21

p. 21 Export controls revised, 7/17, p.19 Nickel scrap, alloying complicates identification, 12/18, p.21 Stretch your nickel with these plating tips, booklet, 7/24, p.50 World consumption forecasts, 8/21, p.19; 10/2, p.19; 12/25, p.57

Employee hazard, lower worker efficiency with high noise levels, Public Health finding, 12/11,

Nondestructive ondestructive Testing: See In-spection, Testing

For higher density in nuclear fuel, vibration compaction used, 11/27, p.24

Nuclear Power: Article (STEEL Feature): Nuclear energy, chain reaction in the electric power market (the core of nuclear power growth), 11/13, p.51

Nuclear plants cheaper than hy-droelectric power, 11/27, p.21 Nuclear powerplant, Virginia Electric, 10/23, p.31

Numerical Controls: Artwork to NC tapes, 7/24, p.29 Bendix alters course in a shifting NC market, 9/11, p.57 Bunker-Ramo: Integrated circuits score again in NC, 8/28, p.57 Cincinnati Turning Center (CTC), NC lathe, 12/4, p.82 and 11/20, n 21

p.21 Computer System 70 offers complete control of NC, 10/16, p.48 Copy milling machine (German) fitted with Bendix Directapath (Douglas Aircraft use), 11/27,

20 Ex-Cell-O general purpose machines toolholder car

machines toolholder carriers, 11/6, p.60

Now NC will shuffle management functions: Harrington of Arthur D. Little reports, 9/11, p.75

Toolmaker (Kearney & Trecker) audits indirect benefits of NC machining (Los Hoydo), 7/17 machining (Lee Herda), 7/17,

p. 69
NC cylindrical grinding, German firm sees payoff, 12/4, p.69
NC potential lies in integrated manufacturing system: Ross (GE), 7/3, p.14
NC punch press for electronics suppliers, 11/20, p.90
Oak Ridge facility has method for correcting form errors in NC machining, 11/13, p.31
SHOP (language) NC computer package, PDS 1020 system, 12/4, p.76r*

package, PDS 1020 system, 12/4, p.76r*
Swedish NC for contour unit, 12/4, p.76r*
Tape programmer for long, unusual sequences, 8/28, p.72*

0

Oceans:
Beryllium added to copper-nickel for underwater hydrophones, 10/9, p.58gg*
Electric underwater tool is safe, 10/30, p.29
Manganese nodules first harvest from sea, 10/30, p.29
Manipulator arm reaches sea bottom, Navy use, 11/27, p.24
Mineral deposits, searching with color photographs from satellites, 11/27, p.20
Navy plans submergence search

avy plans submergence search vehicle (DSSV) for '70s, 8/7,

Undersea oil storage via A-Blast, 10/30, p.31 Underwater living and working facilities a step closer, 10/30,

Underwater station Westinghouse project, 7/3, p.19

Office Equipment: Automated filing system at Farrel, 11/6, p.70d* Punched card bookkeeping 7/3,

Oil Industry: Industry faced with problem supplying low content sul-12/11, p.139

Optical Scanning: Optical scanning eases document bottleneck, 11/13, p.77

Orders, Deliveries:

Customer balance: Who's run-ning your business? 8/19, p.107 Grumman Aircraft computer speeds order flow, 12/18, p.58

Oxygen Furnaces: See Steelmaking

Packaging, Containers:

Packaging, Containers:
Complex packaging problem posed at PNMI show, 9/25, p.27
Marine cargo containers needed by 1975, 12/18, p.80
Plastic spaghetti-like strands for foam packing, 9/25, p.53
Packaging-waste disposal study, 7/17, p.25

7/17, p.25 Shipping con 7/17, p.25 nipping container cools atomic heat, SNAP-27 generator, 7/31, Strapping system bands aluminum extrusions, 9/11, p.78 Strapping systems (Stanley): Tie

band machine cuts scrap, boosts accuracy at U. S. Steel's Pitts-burg, Calif., Wks., 8/21, p.50e*

Paint Industry: Market report, 9/25, p.105

Painting System: Budd's two-line painting system, automotive div., 10/23, p.72

aints: See Finishes, Coatings,

Patents:

Patents:
GE patents computer for metal rolling mills, 8/7, p.32
Maraging steel produced by P/M, new patent, 10/23, p.31
Steelmaking processes new, patents issued, 8/21, p.15 computer for metal

Peeners: See Cleaning, Blasting

Pensions: Private pension plans threatened by Social Security benefits, 9/18,

p.21 cel and copper industries, pen-sion per month, 7/24, p.19

PeopleMover: See Transportation

Petroleum Industry: Market trend report, 11/27, p.98

Photography:

Satellite photos spot mineral deposits, 9/4, p.68a*, and 8/14,

Pipelines: Electron beam to weld pipelines, 7/24, p.27 7/24, p.27 Sewage slurry pipeline, 7/24, p.25

Pipe Mills

Stellite Wks.: Cold pilgering mill produces precision pipe, 8/28, p.70* bars

Pipe, Tubing, Fitings: Tube reducer, Argonne Lab, 11/27,

p.27 Tubing for desalination plants, 12/4, p.73

Plastics

37 industry-market report, 12/4, 0.116 p.116
Auto use (STEEL Feature): Plastics boom shakes Detroit, 12/18, p.41

p.41
Auto industry use, 'breathing spell,' 7/17, p.35
Automotive plastics fabricating techniques, 12/25, p.18
Building applications, market trend, 7/24, p.84
Cold forming ABS plastics, 8/7,

p.31 Ford tries process of warm forged

plastic parts, 7/17, p.21 Injection molding machine build-ers, Cincinnati Milling may enter

ers, Cincinnati Milling may enter field, 12/11, p.27
Injection molding machine-4000 ton clamp capacity, 8/21, p.13
Navy ships use plastic structures, 7/17, p.67
Plastic parts molded in one step, Intermold tech., 9/18, p.29
Plastic used in maintenance of rail joint, Scotchply epoxy-fiberglass composite, 8/7, p.84h
Toolbuilders eye plastics, 7/17, p.25

Plating Industry: Market report, faces three hurdles in '68, 12/25, p.56

Plating: See Electroplating, Plating

Pneumatic Tools:

from low cast line at Black & Decker, 9/18, p.80

Pollution:
Ammonia burning system for generating power and pollution control envisioned, 8/14, p.27
Eriez forum, new ideas in pollution fight (magnetics a new development), 10/9, p.27
Eriez waste disposal project with Pennsylvania county commissioners, 8/14, p.72b*

Pollution: A systems response, not single entity, 8/7, p.23
Pollution control equipment markets forecast by Hays Corp.'s Hamlett, 11/6, p.101
Steel industry executives request tax relief on air and water pollution equipment, 9/18, p.19
Systems approach for clean air and water (Impact Issue) 9/4, p.S-12

p.S-12
Tax credit on equipment urged by
Fragomen, Cort, 10/23, p.25
See also Air Pollution
See also Water Pollution

Polymers: Isostatic pressing of polymer bearings for structural parts, 10/23, p.27

TRW studies high temp polymers as potential lubricants, 9/11, as potential p.82h*

Porcelain Enamel: Phosphorescent pigments in por-celain enameling systems, 11/20,

Powder Metallurgy:
1968 markets, banner year forecast, 12/4, p.27
Cold Stream Impact process makes
metals finer, 9/4, p.25
Dry powder tech. for coating
steel strip with aluminum,
BISRA, 12/18, p.27
IPM survey, where P/M parts are
going-market dispersal, 11/13,
p.31

p.31
Maraging steels produced by powder metallurgy, new patent, 10/23, p.31
Secondary machining at Symmoo expands P/M application, 9/11,

p.61 Tantalum powder for capacitors, price cut, 12/11, p.29 Zinc powders produced from molt-en metal via jet process, French patent, 12/18, p.28

Power Transmission (Mechanical): Hydrostatic drives (STEEL Feature), 9/25, p.47

200,000 ton forging press, AF awards study contracts, 12/18,

p.21
Automatic brass extrusion press, Cerrobrass, 11/20, p.57
Isostatic pressing of furnace stopper heads at Vesuvius Crucible, 8/7, p.29
Jorgensen to forge parts on new hydraulic press, 7/31, p.48d
NC punch press designed for electronics suppliers, Di-Acro equipment, 11/20, p.90
Precision molding press, 100 ton, for powder metal parts, 12/4, p.29
Stretch formers at Boeing for

Stretch formers at Boeing for jumbo jets, 12/18, p.59*

Pressure Vessels: Linde welds cryogenic tanks of 9% nickel with new technique,

11/20, p.67

Nuclear steam system needs giant reactor vessels, standards essential, 11/13, p.55

increase may

nickel hike, 9/25, p.94 teel bars, producers follow raise initiated by Republic, 9/11,

Titanium, how prices will compare with steel and aluminum, 7/3,

Product Liability: Litigation, defense outlined, 12/18, p.19

Product Managers: STEEL Feature: Controversial go-getters, 8/21, p.41

Product Planning: GE (Watts) Missile & Space Div.: When to shelve a project, 8/28,

p.21 How a market determined a machine, Cincinnati Lathe team studies needs first, 12/11, p.84 Simple chart gets new product to market, Tysaman abrasive cutoff machine, 7/31, p.48

Production Control: See Computers

Production Engineering Research Assn. (PERA): Face mill cuts cheap, clean swath, 10/16, p.47

Production Processes:
Ausformed steel process at Ford, 19/9, p.59n*
Automated line for auto brake parts, Barnes Co., 12/4, p.76k*
New silicon carbide process cuts cost, Satellite Alloy plant, 8/14, p.72d*

Profile Milling: See Machining

Profit Sharing: Lodding Engineering: Nothing like money to motivate people, 11/13,

Profits: See Financial

Public Problem Markets: A trillion dollar era begins, Impact Issue, 9/4, p.37 Federal agency needed for problems, 7/31, p.13

Pumps:

Fuel injection pumps made from special sections of stress re-lieved carbon steel, 12/11,

Punches:
Computer controlled punch, Strippit Div., 7/31, p.22 and p.51
NC punch press for electronics suppliers, 11/20, p.90
Urethane punch (see Forming, Bending)

Purchasing Agents:
Become more management conscious, PAs advised by NAPA's
Raftery, 8/14, p.97
Los Angeles business improvement, 7/3, p.71
Industry reports differ from L.A.
to Chicago, 11/20, p.135
PAs see steel liquidation of inyentories ending, 9/25, p.21

Quality Control:

Quality experts try cost-analysis elixir, 7/24, p.48

Rotary quenching of small parts provides uniform hardness, 9/18,

R

Radiography: AF lab, back-emission electron radiograph used for nondestruc-tive testing of metallic surfaces,

Radioactive source of neutrons is portable, 11/6, p.63
Ultrasonic radiation benefits electrodeposition of alloys, 7/10,

Radio, Television:
Printed copy broadcast on TV,
RCA experiment, 7/10, p.64s*
TV sets lead in hardware popularity, Commerce Dept. report, ity, Comp 8/28, p.19

Rail Suppliers: Market report, 10/9, p.194

Article (STEEL Feature): Rail-roads: Back on spending tract, getting goods to market, 11/6,

"Accordion" tankcar (shortened or lengthened), 9/25, p.29 Automatic car identification sys-tem made by Sylvania, 10/16, p.15

Automatic scanners compete for railroad car market, 9/18,

p.126f*
Automated surveillance and control system for trains, 12/4, p.25
Computer gages rail car's pulse, 7/10, p.31
Computer (TRAIN) reports freight car operation, 7/17, p.27
Corridor cars cut travel time, New York-Washington, 7/31, p.20
Crewless electric train hauls coal, Muskingum project, 10/9, p.25
Freight hikes proposed, 7/17, p.23; ICC approval, 8/7, p.21
PRR unit train concept for moving iron ore, 10/16, p.54a*
Plastic outs steel in maintenance of rail joint, 8/7, p.84h*
Santa Fe RR: Large transformers tied down for rail shipment, 8/14, p.72b
Westinghouse power systems for rail commuter cars (N. Y.-N. J. 8/14, p.92

Westinghouse power systems for rail commuter cars (N. Y.-N. J.), 8/14, p.27
See also Transportation

Railway Progress Institute: Gray Jr. (chairman): Railro outlays must rebound, 9/1

Rapid Transit: See Transportation

Lead, copper recovery from scrap, new method, 11/27, p.23

Reduction Mills: Cold pilgering mill at Stellite Wks., Kokomo, Ind., produces precision bars and pipe, 8/28, p.70* nill at Stellite

Refineries: See Smelters, Refin-

Refractories:
Composite 'Cermotherm' tests refractory life, Austrian process, 7/31, p.17
Porous refractory plug system improves iron castings, cuts foundry costs, 10/9, p.58q*

Refractory Firms: Mergers: Combustion Eng. with Ramtite, others, 8/14, p.25

Refractory Metals:
Electroclad refractories lick corrosion problems, Stellite Div., 10/9, p.58u*
Organometallies decomposition to produce refractory metals eyed for space, 12/4, p.27
Refractory dies for copper developed, Incra report, 9/18, p.19
Refractory metals carburized continuously, vacuum furnace, 12/11, p.94a*
Symposium spotlights refractory research, NATO Conference, 10/9, p.58b*

Research & Development: U. S. spending tops \$23 billion, gov't, industry, educational in-stitutions, 8/14, p.21

Retail Sales: Forecast for '68, Boston consult-ant, 11/6, p.99

Retirement: Steelworkers slow to pick up early retirement option, 7/24, p.21

Nickel mining expanded, 10/16, p.22

Rivets: See Fasteners

Computer control of expressways predicted, 11/13, p.27

Robots: See Industrial Robots

Rolling Mills: Czech mill rolls thin foil, 7/17, p.29

p.29
Prestressed rolling mill, Hunter design, 9/11, p.29
Ultrasonic rolling of metals halts at Westinghouse, but still promising, 8/7, p.84a*
Urethane forming, steel brake bands rolled in one pass at Bossert, 8/7, p.84b*

Auto production by 1975, 11/27, p.28

p.28
Automated investment casting firms, 8/28, p.28
Bid to build turbines for Grand Coulee Dam ruled out by U. S., 7/24, p.21
Flat plant gets C'earing Div. stamping presses, 9/25, p.27
Fiat connecting rods cast from pearlitic malleable iron, 10/16, p.14

Fiat export-import loan cut, 10/16,

p.14

Moscow gets ITT telephone info center, 8/7, p.25

Moscow process quenches coke with gases, 8/7, p.31

Steelmakers use longer, more slender ingots, 12/25, p.15

Titanium sponge dumping in U. S., 12/4, p.19

Trade mission sponsored by Minneapolis Chamber of Commerce: Trade behind iron curtain, 8/28, p.62

S

SCR: See Electric Power

STEP: See Training

Safety: See Automotive

Engineer graduates, salary sched-ule, 11/27, p.22 Overseas execs compensation ris-

ule, 11/27, p.22
Overseas execs compensation rising, McKinsey survey, 10/23, p.23
Texas Instruments put hourly workers on salary, 12/11, p.89

Sales Executive Club:
Sales Manpower survey: Salesmen's compensation and expenses, advertising, promotion, penses, advertising, promotion, etc., 10/30, p.27

Satellites:

Space Material & Develop-

Automatic scanners compete for railroad car market, laser via electronic devices, 9/18, p.126f*

Scientists: Union Carbide management scientists: Science enriches decision making, 11/27, p.57

Scrap chopper improves knife life, 8/7, p.80

Scrap chopper improves knife life, 8/7, p.80
Shredding unit for scrap tin plate, magnetic handler-conveyor system cleans scrap for detinning, 12/25, p.31

Screw Machine Products Assn.: Market trend, orders-shipments, 11/13, p.108

Sealing: Hydrodynamic seal reduces oil leaks, 11/20, p.27

Selling: See Marketing

Service Centers: Market trends, 7/3, p.70

Sheet & Strip:
Auto labor settlement spurt in sheet steel, 11/6, p.89 sheet steel, 11/6, p.89
Beryllium sheet long-length with
new cross-roll tech., 9/18, p.29
Prepainted steel sheet spot cleaned
for welding at Inland, VacuBlasting process, 9/18, p.112h*
Zinc strip continuous caster, 7/17,
p.83

Shipments:

Steel shipments curbed by truckers' strike, 9/25, p.93

Shipping: Autos shipped by rail, 7/17, p.119 Iron ore shipment, PRR unit train concept, one train from origin to destination, 10/16, p.54a. Large transformers tied down for rail shipment, 8/14, p.72b* Liquid methane, tankers built, 9/11, p.29

Ships, Shipbuilding: Automatic system for painting hulls, Japan, 8/28, p.32 Bids for container ships asked by Matson, 9/4, p.19 British order container ships,

British order container ships, 8/28, p.21 Build Abroad proposal challenged by shipyards, 7/17, p.116 Containerships, computer controls cargo, 8/7, p.84j* Naval assault craft rides on

cargo, 8/7, p.84j*
Naval assault craft rides on cushion of air, studied at Aerojet, 12/11, p.25
Navy uses NC at Mare Island shipyard, 12/11, p.94g*
Newer steels cut ship costs (oil tanker) Sweden, 9/25, p.29
Plastic structures for new Navy craft, 7/17, p.67
Research subs to tackle underseas, metalworking market, 11/6 p.98

Research subs to tackle underseas, metalworking market, 11/6, p.98 Ship hulls corrosion problems, pretreating weld surface before painting, Sweden, 8/21, p.17 Stretch form machine for ship hulls, 10/9, p.31 U. S. Merchant Marine margin of sea power threatened by Russia, 12/11, p.21

Shotblasting: Magnetic shotblasting, 7/17, p.32 British.

Shot Peening: Shot peening surface of titanium with glass beads reduces cor-rosion, NASA, 8/28, p.29

Shredders: See Scrap

Silicon Carbide:

New silicon carbide process cuts costs, Ammet's new production hierard, 8/14, p.72d*
Silicon carbide—auxiliary fuel adds flexibility to BOF, Carborundum, 8/7, p.84e*

Skilled Workers:

Skilled Workers:
Lend-lease production workers,
agreement between Northrop and
Lockheed, 11/20, p.19
MIND: NAM basic education program, 8/14, p.58
STEP: NAM solution to employment problems, 9/18, p.97

Small Business Administration: Loans 80% on used machine, 11/20, p.25

Smelters, Refineries:
Alcan postpones Que. aluminum smelter, 10/2, p.17
Aluminum smelters near geographic center of markets desirable in transportation cost, 11/27, p.21

Copper smelter to use oxygen, 12/25, p.14

12/25, p.14

Electroslag refining is commercial,
BISA unit, 11/13, p.31

New York nonferrous producer
negotiates for Imperial smelting
process, Power-Gas to build,
8/28, p.19

Nickel smelter, Australia, 9/18,
p. 32

Smelting furnace installed at Union Carbide, Alloy, W. Va., plant, 11/13, p.84

Swiss aluminum smelter may be built in Britain, 9/4, p.21

Social Security:

Private pension plans threatened by social security rising costs and benefits, 9/18, p.31

Solar Energy: Forced circulation solar hot water system, Australia, 7/10, p.27

Plastic clamps for soldering, resili-ent pads of Viton, 7/31, p.22 Soldering-automatic system (safe-ty razor maker), 7/10, p.64

Solid State Power Conversion: See Electric Power

Space Materials & Developments: Air cushion landing studied, conference report, 7/10, p.23 Astronauts on yearlong mission may use a regenerative life support system under dev

port system under dev. Lockheed, 12/11, p.29

Chart: Space development time-table (TRW), 8/7, p.31 Cryogenic pipe aligned with Tef-lon, 7/3, p.17 Flying saucer report by Dr. Mc-Donald, physicist, 9/4, p.21 Fuels for SST, transpiration cool-ing, 7/31, p.20 Impaction machine prototype, from missile silo to giant forge, 9/18, p.29

p.29
Liquid ammonia steadies thrust
to Resistojets, 7/3, p.17
Pulsing of small control rocket engine more than a million times
(long life space vehicles planming), 10/9, p.27
Satellite handles massive business
data transfer, IBM, 8/7, p.84q*
Satellite-Gemini photos spot mineral deposit areas: Dr. AbdelGawad, geologist report, 9/4,
p.68a*

p.68a* Satellite-photos show mineral de-posits, 8/14, p.29 Simplicity trend in spacecraft, 9/18, p.23 Weather forecasting data via satel-lites, 8/7, p.27

Electrical energy output to double, Ready for U. S. firms, 9/4, p.21 7/3, p.19

Spinning Machine:
Tape controlled power spinning machine, 10/2, p.15

Stainless Steel:
Article (STEEL Feature): Stainless—bright past, brighter future, producers-chart, market-shipments, 7/17, p.57
J&L basic oxygen furnaces can produce stainless, 300 and 400 series made by LAM process, 11/13, p.19
Soft stainless easy forming and

oft stainless, easy forming and cutting, Crucible's Rezistal, 7/3,

particle research at Argonne lab, 11/6, p.64

Stampers: Industry outlook, 8/14, p.96 and 11/13, p.108

Stamping: Electroforming short run stamping and diecasting dies, 7/3, p.40 Progressive dies make stampings easy from abrasive materials, 12/4, p.76h*

Peyton (institute) speaks on industry interest, gas pipelines, etc., for safety, 10/30, p.23
Standard computer codes slated, 8/7, p.27

Trowbridge (Commerce) may create two panel interagency committee to review standards, 7/10, p.21

Stanford Research Institute: Dr. Gibson: Technology spurs world business, 11/27, p.21

State College (Pa.): Researchers investigage chemical strengthening of ceramics, Lind-en Lab., 8/4, p.27

State Programming:

A look at our state capabilities, new institute study, Campbell president of ISP, 8/14, p.63
Area development: How states are doing; what they offer (insert), 12/4, p.65

hio economic developers woo out-of-state industry, 9/11, p.25

Ausformed steel improves fatigue properties, Ford dev., 10/9,

Specialty metals, growth outlined by Amax-MacGregor, 12/18,

p.29
Structural steels, Trip process promises strength, toughness for steels (transformation induced plasticity), 8/14, p.62
TRIP steel, new process for high strength structurals, dev. at Univ. of Calif. (Dr. Zackay, Dr. Parker, etc.): You don't have

to trade strength for ductility, 8/14, p.62
TRIP steel (STEEL Feature): The metal that repairs itself, dev. at U. of Calif., 10/9, p.73
Superalloys used for dies, 10/9,

Steel Billets: Clad steel tube, rod extruded with-out heat, 8/7, p.79

STEEL Features:

Alcan shortens its 'pipeline', 8/14.

p.53 Area development—The battle for new industry, 12/4, p.61 Bendix alters course in a shifting NC market, 8/11, p.57

Cerrobrass puts ton-a-minute ex-trusion press on stream, 11/20,

p.57 Construction—materials battle gets hotter, 7/24, p.43 Copper Range digging out, prog-ress from 1959 to 1960, 10/16, p.37

Foreman-Your link to labor a changing face, 8/7, p.65 M's Hydra-Matic Div., second

GM's Hydra-Matic Div., second tech center, 7/3, p.33
Integrated circuits score again in NC (Bunker-Ramo), 8/28, p.57
Managers planbook, 10/2, p.39
Negro supervisor, an industry look, 10/23, p.53
Nuclear energy: Chain reaction in the power market, The core of nuclear power growth—metals, 11/13, p.51
Plastics boom shakes Detroit, 12/18, p.41

Plastics boom snakes Detroit, 12/18, p.41

Product Managers: Controversial go-getters, 8/21, p.41

Railroads: Back on spending track, getting goods to market, 11/6, p.40

Bright Stainless: Bright past, brighter future, 7/17, p.57 Texas Instruments terms clad met-

als-metalworking's \$1 billion infant, 9/18, p.75 Tomorrow's man manager

your successor: Appley, AMA, comments, 12/11, p.77 ip steel: The metal that repairs

trip steel: The metal that repairs itself, 10/9, p.73
U. S. gains on electroslag melting (ingot-rotor steel), 7/31, p.39
Wean makes its move (build rather than sell or merge),

What metalworking managers expect in 1968, 11/27, p.49
World agribusiness-equipmakers

race against hunger, 10/30, p.55

Steel Import Bill: See Foreign Competition

Automakers usage, estimated ton-nage '67, 12/11, p.21 Earning, Profits (see Financial)

arning, Profits (see Financial) r. Hogan speaks on worldwide steel industry and economy at Steel Service Center Institute meeting, 10/16, p.13 land's Block predicts 2nd half, 7/10 p.56 Inland's Blo 7/10, p.25

7/10, p.25
Kaiser report, steel mill products
used by seven Western states,
7/10, p.81
Kaiser survey: U. S. and Japan
vying for BOF leadership
(planned U. S. BOF additions),
10/9, p. 23

(planned U. S. BOF additi 10/9, p.23 Labor controversies cause of steel production, 9/25, p.92 Steel import study (see Fo Competition)

Steel shipments curbed by truck-ers' strike, 9/25, p.93 Truckers strike, bakery trucks load up, 9/25, p.21

Steelmaking: AISE meeting feature: Another look at direct steelmaking, 9/18,

sleeve stops erosion ladle stoppers at slag line, 7/31,

ideas going begging? Patents, new processes, 8/21, p.15
BOF charge aided by addition of silicon carbide, 8/7, p.84e*
BOF for making stainless, 300 and 400 series by LAM process, 11/13, p.19

Deoxidizing steel, two step method, 12/11, p.27

Direct reduction aids electric furnace continuously charged with pellets from SL.RN rotary kiln, 7/31, p.22 irect steelmaking process, Brat-

Direct steelmaking process, Bratton patent, 9/18, p.82
Electric furnace fed auto scrap, ore, 12/18, p.25
Electroslag melting of ingots, Mellon Inst. research, STEEL Feature, 7/31, p.40
Electroslag remelt metals market, Mellon and Wright Patterson lab report 8/14 n 23

Mellon and Wright Patterson lab report, 8/14, p.23
Fledgling steelmaker takes on Goliath, new North Star Steel Co., St. Paul, 11/27, p.59
Iron flowing from blast furnace, temperature measured continuously by lance, 7/31, p.21
Kaiser Engineers: Steel mill products used by Western states, 7/10, p.81
Kaiser Engineers: L-D oxygen steel production to top open hearth in 1970, 8/14, p.31
Kaiser Engineers: U, S.—Japan vying for BOF leadership, planned U. S. BOF additions, 10/9, p.23
Scrap preheating aids BOF heats, 12/18, p.23

Steel Mill Controls:
Cold mill gets adaptive control,
British, 12/25, p.15
Computer controls seen by steelmen, 10/16, p.17
Directo-Matic control on Bethlehem slabbing mill, 8/14, p.72g
GE patents computer for metal
rolling mills, 8/7, p.32
GE develops markets for process
control, 11/27, p.96
Plate mill (Alan Wood Steel) computer system, 9/18, p.25

Steel Mill Products: 3rd quarter inventories, 9/4, p.89 Steel mill products used by seven Western states (Kaiser report), 7/10, p.81

Steel Mills:

Steel Mills:
German firm builds mill in Georgetown, S. C., 10/23, p.27
Granite City opens 80 in. hot strip mill, computer controlled, 8/14, p.61
Japanese steel boosted by new facility (Mizushima Works of Kawasaki Steel), 8/14, p.72
Malaysia gets steel works, 9/4, p.21

p.21
Mexican steel plant opposed by farmer group, 10/9, p.23; dispute ends, 11/27, p.28
Oregon steel complex built by Gilmore Steel, 11/6, p.31
S. Korea consortium headed by Koppers, 11/6, p.32
Twin Cities industrialists seek region as fertile steel market (North Star): Fledgling steelmaker takes on Goliaths, 11/27, p.59 n 59

Yugoslavia steel mill built by two British firms, 12/4, p.32

STEEL's Panel of Economic Consultants:

Survey: Reaction to tax increase, 7/10, p.7
Semiannual survey: What will surtax do to spending? 9/18, p.7

Steel Service Center Institute: Welch: Market trends, 7/3, p.70 Welch: Unexpected strikes hurt industry, 10/23, p.101 Fr. Hogan, Fordham economist, addresses Northern Ohio Chap-ter, comments on worldwide steel industry, 10/16, p.13

Automated storage handling speeds production (Worcester Valve's Triax), 8/7, p.74

Strapping:

Strapping:

Nylon Dymac strapping used to band together aluminum extrusions, 9/11, p.78

Stanley Strapping Systems Div., U. S. Steel: Tie band machine cuts scrap at Pittsburg, Calif., Wks., 8/21, p.50e*

Stretch Forming:
Airplane replacement sections,
stretch formed press brake,

Code: *-Metalworking Edition only; †-Metalproducing Edition only; IE-Industrial Equipment

Jumbo jets call for big stretch formers, Boeing 747 fuselage skin sections, unit built in France, 12/18, p.59* Stretch form-NC machine for ship hull structurals, 10/9, p.31

Fabricators, market report, 9/25,

Fibersteel process floats structures,

10/9, 0.58;*

Trip (transformation induced plasticity) provides tougher structural materials (Dr. Parker and Dr. Zackay), 8/14, p.62

Submarines: See Ships, Shipbuild-

Supersonic: See Aircraft

Surface Analysis:

E's Dr. Harris: Better surface analyses are possible with new secondary electron spectroscopy, 8/21, p.50f*

Surface Treatment:
Metalliding, new system for surface coating, GE, 7/3, p.37
Surface conditioning on plating lines (Enthone dev. for Imperial Electroplating), 8/14, p.68
Tungsten carbide coatings for surfaces of cutting tools, punches, and dies give wear resistance, 11/6, p.55

Entry into U. S. technical mar-kets, 11/27, p.28 U. S. quality markets eyed by industrialists, 12/18, p.48

Systems Analysis: Systems analysis tool for solution of social problems, 12/11, p.21

Systems Approach:

Systems Approach: Clean air and water—systems ap-proach offers profits (impact is-sue), 9/4, p.S-12 GE uses systems approach to probe future planning, 8/14, p.64

T

Tape Programmer: See Numerical

Taxes:
7% tax credit: How fast will it help capital spending? 8/7, p.19
7% tax credit: How it aids tool buyers, 10/2, p.54
Corporate and personal surtax debate, 8/14, p.17 and p.19
Depreciation reform, industry lag, 11/13, p.21
STEEL surveys industry on proposed tax increase, 7/10, p.7
STEEL's Panel of Economic Consultants: What will surtax do to spending? 9/18, p.7
Verity (Armco): Impact of proposed surtax, 8/28, p.19

Technology:
A view of things to come: Cheaper air freight, satellite communication, electrical power, 7/31,

p.13 Kaiser Aluminum applies advanced technology, streamlines produc-tion-marketing units, 8/28, p.60

Telephone: Design drawings retrieval s via telephone, 10/23, p.25

Tin: Tasmania tin mine venture, 10/9,

Titanium:
Hot die forging study aimed at
hiking titanium potential, IITRI,

hiking titanium potential, 11114, 8/14, p.60
Soviet sponge dumping in U. S. triggers fracas, 12/4, p.19
Textured titanium alloys for aerospace use, 7/10, p.31
Texturing promotes strength, 7/31,

Tool & Die Industry:
Market report, 9/11, p.113
1968 outlook: Customers exp
to 'pull back,' 12/25, p.59 expected

Tool Steel: Crucible's P/M breakthrough, new generation of tool steel, 12/11,

die forging, alloy selection,

Tools & Dies:
Giant aluminum tools feature assembly jigs and fixtures for building Boeing 747 fuselage, 7/3, p.46

Progressive dies for making stampings, 12/4, p.76f*
Stretch forming dies made from foamed polyurethane plastic at Norair, 11/20, p.29

Tools (Cutting):
1968 market outlook, 12/18, p.81
Carbides cut threads, thread
whirling process used by European and Japanese, 8/28, p.61
Diffusion between carbide tool tips
and uranium softens tools, 7/10,

n.31

p.31
Face mill (PERA) cuts cheap, clean swath, 10/16, p.47
New milling cutter (English) shaves costs, 10/9, p. 31
Tungsten carbide coatings for cutting tool surfaces, 11/6, p.55

Tools (Hand):

ir tool (portable pneumatic) market faces scrimmage from low cost line, Black & Decker line, 9/18, p.80

Minneapolis businessmen tour Iron Curtain countries, 8/28, p.62

Long-range training plans needed, Commerce viewpoint, 7/3, p.13 MIND (methods of intellectual development), new method for unskilled workers, 8/14, p.58
STEP (solutions to employment problems), 9/18, p.97
Vocational training needs cited by ASPA, 9/25, p.25

Transportation:

ir freight cheaper than truck-load, forecast for future, 7/31,

Aluminum market for components,

Aluminum market for components, 11/27, p.20
Autodom's stake in tomorrow's transportation systems, interviews with Ford's Seward and GM's Spreitzer, 10/9, p.35
Bolivian transport study by U. S. firms, 7/17, p.27
Freeway lanes for buses urged by GM's Caserio, 9/25, p.25
Mass transit studied by Reynolds, 7/17, p.25
Monorail balance on curves maintained by lock-on track, 7/17, p.25

p. 25
PeopleMover (Goodyear), futuristic shuttle system, 7/10, p.23
Public problem markets (Impact Issue), mass transit systems, 9/4, p.S-20
Railroads: Getting the goods to market, back on spending track (STEEL Feature), 11/6, p.49
Rapid transit, Baltimore study, 7/24, p.21
Rapid transit, linear motor-2500 hp dev., 12/18, p.25
Rapid transit study, Oahu, Hawaii, fixed track, 7/24, p.644°

p. 64d*

Train system-remote control for airport, etc., 12/11, p.29 Transit system, Coanda Nozzle force, 9/11, p.29

Trip Steel:
STEEL Feature: The metal that repairs itself, 10/9, p.73
U. of California: Process holds promise of tougher structural materials, 8/14, p.62

Tube Mills:
Diescher mill revival pushed by
B&W and McKay at AISE conference, 10/2, p.17
Russians try tube tearing instead
of cutting, 12/4, p.31
Yoder: EB tube welding goes outof-vacuum, 10/23, p.60

Tumbling:
Rotary cascade tumbling barrel,
more vibration, 7/17, p.31

Tungsten Carbide: Motorola: Tungsten carbide coat-ings for cutting tools, dies, 11/6, p.55

Turbines: Turbine engine design combines steam and gas, Feher Cycle, Douglas Aircraft. 9/25, p.31

Ultrasonics:
Army tests gun barrels with automatic, computerized ultrasonic system, 11/20, p.102m*
Multifrequency sound waves cleans faster, 11/20, p.29
Ultrasonic checks bearings, 8/28, p.65

Ultrasonic checks bearings, 8/28, p.65
Ultrasonic cleaning system (rotors and gears), 8/28, p.65
Ultrasonic cleaning used after salt bath, 12/4, p.29
Ultrasonics clean microscope parts at Diecraft, 11/20, p.102m*
Ultrasonics finds gas leaks, 7/31 n.20

p.20 Ultrasonics test cutting, 8/7, p.25 Westinghouse halts project for ultrasonic rolling of metals—but still promising, 8/7, p.84a*

Underwater: See Oceans

University of Arizona: Dr. McDonald: Flying saucer reports, 9/4, p.21

University of California:
Computer-transportation and distribution, 'TranSim,' 8/7, p.25
Dr. Perrin: Opposes computer instruction, 9/18, p.23
Dr. Zackay and Earl Parker head team in development of TRIP steel, 10/9, p.74
Socio-Technical systems studies added to curriculum, 8/14, p.23

University of Manitoba: HERF's effect on fatigue strength, 7/24, p.29

University of Michigan:
Dr. Herzog: How to save with computer design, 10/30, p.65
Dr. Rehmus: Industrial relations field grows, 9/11, p.23
Rehmus: Has railroad labor blocked innovation? 11/6, p.54
Prof. McCracken: '68 profits better than thought, 12/4, p.19
Manager training and development programs, cost estimated, 8/14, p.19
Prof. Suits predicts 1968 economy.

of. Suits predicts 1968 economy, 11/27, p.31

Dr. Johnson study: Foreman, a changing face (STEEL Feature), 8/7, p.65

Uranium: Seaborg (AEC) views uranium market through year 2000, 11/13, p.29

Urban Affairs:

A look at our State capabilities (study by new organization, the Institute on State Programming for the '70s), 8/14, p.63
Aid-to-ghetto employment, guideline for businessmen, 12/18, p.23
Ford organizes department, recruiting centers, 11/6, p.37
Public problem markets, a trillion dollar era begins, 9/4, p.37
Urban ills need help of business (Sen. Griffin), 10/2, p.19

USWA: See Labor

Vacu-Blast: See Cleaning, Blasting

Fasteners made stronger via vac-uum processing at Allen Mfg., 8/21, p.50

Value Engineering: Japanese try value engineering too (seminar by Raytheon's Sher-win), 8/7, p.73

Valves: Air cylinder control with basic positioning circuit, 8/7, p.84j* Space valve responds to tempera-ture, 9/25, p.29

Vanderbilt University: Dr. Williamson: Playing company politics a must, 10/30, p.23

Vapor Deposition: USSR Academy of Sciences: Superconductor made continuous-ly, 8/21, p.21

Vending Machines: Market report, 9/18, p.157

Vibration:
DC-9 vibration cut via computer,
7/10, p.29
Vibratory driver-extractor for

sinking caisson, 10/30, p.25

Wage-Prices: Talk about wage-price freeze, Irv-ing Trust exec., 11/20, p.21 Wage increases for contract settle-ments, all industries (3rd quar-ter-67), 10/23, p.21

Wastes:
Acid mine wastes into ultrapure water, Altoona plant, 8/28, p.25
Houston gets industrial waste disposal facility, 11/20, p.23
Packaging wastes disposal studied, 7/17, p.25
Sewage slurry plant, pipeline, 7/24 p.25
Waste disposal project undertaken by Westmoreland County commissions in Pa. and Eriez Magnetics, 8/14, p.72b

Water Desalination:
Desalting plant, San Diego, named after late Sen. Engle of Calif., 9/4, p.28
Desalting plant built on site, 12/18, p.25
Desalination tubing market, 12/4, p.73

p.73 English firm wins plant contract in Los Angeles, 9/18, p.32

Water Pollution:

Water Pollution:
Government - industry pressures:
War against water pollution
heightens, 7/31, p.45
Injections of fluorescent red dyes
in Missouri River give pollution
data, 11/13, p.23
Lake pollution different from its
counterpart for rivers, Sen.
Muskie report, 8/14, p.21
Pollution control to cost billions,
Dr. Hirsch, federal agency, reports, 8/14, p.21

Water Treatment: Farval strainers keep industrial water clean, 10/9, p.58d* Reverse osmosis purifiers sold, 7/3, p.22

Welded Steel Tube Institute: Market trend, 11/13, p.107

Welding Electrodes: Market report, makers innovate to stay alive, 8/21, p.73

Welding Equipment: Design changes prompted by arc-welding sales slump, 12/11, p.140

Welding (Arc):
Groove weider speeds thick plate joining at Linde, 11/13, p.73
Open arc welding process, switch from manual to semi-automatic at Taccone, 8/28, p.71*
Plasma arcwelding widens its scope, 7/17, p.80
Plastic sheets welded faster using Plastherm hot-gas welding with attached profile nozzle, 10/16, p.54a.*

p.54a*
Portable weldhead controls arc, 10/30, p.25
Shop know-how triumphs over 9% nickel steel weld problems (cryogenic vessels) Linde Div., 11/20, p.67
Welder travels elevated track at

Yelder travels elevated track at Bethlehem shipyard, 8/14, p.31

Welding (Buttwelding):
Vertical butt or fillet welds in aluminum, British, 10/16, p.17
Vertical welder for aluminum avoids flux problems, Aluminum Labs, England, 12/25, p.32

Welding (Electron Beam):
Automaker researches new EB process for welding parts, Cathobeam process, 10/23, p.74d*
EB welder takes 96 in, jet parts, 7/17, p.32
EB tube welding goes out-of-vacuum, Yoder Co., 10/23, p.60
EB welder adds space touch to jet aircraft maintenance, 12/4, p.72
Flame cut tracker controls welder, 7/10, p.29
Ford Motor use, Livonia, Mich., line, 8/21, p.17

Welding (Explosive):

Explosive spot welding explored AF, 9/25, p.31

Welding (Friction): Auto firm cautions on making cluster gear blanks for transmis-sion by friction welded forged halves, 7/24, p.29

Welding (Fusion): Unit controls fusionweld penetra-tion, dev. by NASA with Mer-rick Eng., 7/31, p.17

Welding (General):
Mild steels more susceptible to brittle fracture by welding, 7/10, p.32

Welding (Hydrodynamie): Combined induction heating and a pulsed magnetic field, 10/9, p.29

Welding (Inertia): Inertia welding joins the job shop, 9/18, p.99

Welding (Laser): Laser speeds prototype production,

IBM, 7/24, p.58 Laser welder reduces reject rate to zero on klystron tubes (Linde), 7/10, p.64s*

Welding (Resistance): Constant weld pressu

Welding (Resistance):
Constant weld pressure stretches
tube mill electrode life, ERW,
11/20, p.64
Ford's use of adaptive (feed back)
welding control outlined by
Mitchell at quality control meeting, 11/13, p.39

Welding (Stud): IBM reports better way to stud-weld, 10/2, p.27

Welding Systems: Farm machine maker (Massey-Ferguson Ltd.) tells some welding secrets (renovated welding department), 9/11, p.62

Coiler modules dev. by Czechs, 11/13, p.32

Coller modules dev. by Czecns, 11/13, p.32
Electropolishing tungsten wire removes surface defects, 7/10, p.31
Spring wire checker, 7/17, p.32
Wire drawing aided by lubricant, 7/10, p.29

X-Ray: Bendix speeds x-ray gaging, Shef-field Measuray series, 11/27, p.69

 \mathbf{Z}

Zinc Industry: Task force setup to combat plas-tics, 7/24, p.25 How zinc's auto campaign is going (1967-'68 model materials us-age), 10/23, p.35

COMPANY INDEX

AMF Thermatool Inc.: Seamwelding process, IE, 12/18,

AMP Inc.: After salt bath, ultrasonic clean-ing, 12/4, p.29

Abex Corp.:
Builds railroad car wheel plant,
Mo., 11/27, p.24
Denison hydrostatic transmission,
7/24, p.68
Denison adds hp to vane motor
line, IE, 8/7, p.88

Acoustica Associates Inc.:
Ultrasonics converts tanks into
cleaners, IE, 7/31, p.55

Adhesive Engineering Co.: Epoxy tape combines peel, heat strength, IE, 7/31, p.53 Epoxy tape bonds at low temp., IE, 9/18, p.137

Adhesive Products Corp.: Solid adhesive bonds below zero, 11/20, p.27

Aerojet-General Corp.:
EB welder takes 96 in. jet parts, 7/17, p.32
Explosive hardening ups metals yield strength, 12/4, p.29
Tests Rankine cycle power conversion system, 12/4, p.27
Water purification system uses reverse osmosis purifiers, 7/3, p.22

Aeronca Inc.: 100,000 lb autoclave for bondin adhesives built by Erie Cit Iron Wks., 11/13, p.29

Air Reduction Co. Inc.: Casting ferroalloys by new tech. could cut costs, 7/10, p.21

Airco-BOC Cryogenic Plants Corp.: Newly formed, 10/16, p.21

Ajax Magnethermic Corp.: Largest induction furnace, IE, 7/31, p.54

Alan Wood Steel Co.: Computer system for plate mill, 9/18, p.25

Alcan Aluminium Ltd.: Aluminum smelter, Arvida, Que., pilot plant for direct reduction, 7/24, p.25; postpones develop-ment, 10/2, p.17 Building cold rolling sheet alu-minum plant, Oswego, 10/16, p.22 minum plant, Oswego, 10/16, p. 22
Cuts ingot production for 2nd time, 9/4, p.17
Norwegian plants add capacity, 7/31, p.19

Alcan Aluminum Corp.: Alcan shortens its 'pipeline,' STEEL Feature, Central Planning Dept., 8/14, p.54
Aluminum alloy for porcelain enameling, 7/24, p.31 and 7/31, p.54
Starts operation of N. C. unit, 12/11, p.130

Alco Standard Corp.: Ipsen adds bottom load furnaces, IE, 8/14, p.77 Ipsen oxidation test furnace, IE,

Algoma Steel Corp.: Installs four-strand continuous casting machine to produce blooms, 11/20, p.31 continuous

Allegheny Ludium Steel Corp.: Buys True Temper, 8/14, p.27 Plastic for hollow steel rolls used in pickling tanks, 10/2, p.28 Structural stainless, IE, 8/14, p.80

Allen Mfg. Co.: Fasteners made asteners made stronger v vacuum processing, 8/21, p.50

Allied Chemical Corp.: Copper plated in recesses with high throw system, 12/4, p.76v*

Allied Research Products Inc.: Cleaners for power spray washers, zinc discasting jobs, IE, 11/13, eracking eliminated in plating of plastics, IE, 7/3, p.48

Allis-Chalmers Mfg. Co.: Fabricating facilities added, 9/4, p.28 p.28 Merger with Signal Oil & Gas, 12/4, p.21

Alloy Surfaces Co. Inc.:
Ductile coating for jet engine
vanes, 11/6, p.27

Alloys Unlimited Inc.: Acquires Automatic Metal Products and Northern Metal Products, 11/13, p.27

Alpha Press & Machine Co.: Licensing agreement with McKay, 8/14, p.25

Altamil Corp.: Acquires Merz Eng., 8/21, p.24

Aluminium Laboratories Ltd.: Vertical butt or fillet welds, new system, 10/16, p.17 Vertical welder for aluminum avoids flux problems, 12/25,

Aluminum Co. of America:
Aluminum casting alloy eliminates
costly silver, 7/24, p.25
Aluminum smelters situated near
geographic centers of markets,
11/27, p.21
Aluminum tubing predicted, 11/20,
p.135 p.135
Executive plane-flying showcase,
Alcoa Forecast, 8/14, p.24
Harper: A look at aluminum industry, 10/30, p.23
Pierce-forged aluminum study, Pierce-forged 8/14, p.29

Amchem Products Inc.:
Alkaline liquid cleans aluminum coil stock, IE, 7/17, p.95
Cleaner for ferrous, nonferrous, IE, 9/4, p.72
Pickling additive, IE, 11/6, p.74
Rust inhibitor for wet or dry surfaces, IE, 10/16, p.56

American Bosch Arma Corp.: Acquires Mystic Oceanographic, Adequires Mystic Oceanographic, 12/4, p.31

Buys Fluid Power Accessories, 12/11, p.32

Cold drawn carbon steel saves in gearmaking for fuel pumps, 12/11, p.94b

American Brazing Co.: Gas-fired hump furnace, 9/25, Gas-fired hump p.60

American Can Co.: Contracts for can coating line, 10/9, p.32

American Chain & Cable Co. Inc.: Flux cored welding wire, IE, 8/7, p.86 p.86 Jib cranes with motorized booms, IE, 7/10, p.67 Permanent magnets-off control feature, IE, 10/2, p.64 Wilson Div.: Rockwell tester-digital readout, IE, 11/6, p.71

American Die Casting Machine Co.: Modifications of discasting unit, IE, 9/18, p.132

American Electric Fusion Corp.: Constant weld pressure stretches

tube mill electrode life, 11/20, Unitized gearbox on tube mill, IE,

American Gas Furnace Co.: Shaker hearth heat treating furnace, IE, 10/9, p.165

American Hoist & Derrick Co.: Buys BROS Inc., 11/20, p.32

merican Malleable Castings Co.: Subsidiary plant under co-tion in Dickson, Tenn.,

American Metal Climax Inc.: MacGregor outlines growth specialty metals, 12/18, p.29

American Metallurgical Products Co. Inc.: New silicon carbide process cuts cost 30%, new plant at Satel-lite Alloy Corp., 8/14, p.72d*

American Monorail: See Fischer Industries

American Motors Corp.:
1968 model press preview: AMC trains for new battle, 8/28, p.35 Air conditioners standard on '68 Ambassador, 9/25, p.25 Chapin: 47.5 million more cars by '72, 8/28, p.25 Javelin sport car, 8/28, p.37 Kelvinator: Computer-aided design, 7/24, p.61

American Telephone & Telegraph Co.: Editorial: Penalty for Proficiency (government edict), 7/17, p.17 All aluminum cable tested, 11/20, p.25

American Zinc Products: See Ball

Ametek Inc.:
Hunter Spring device adapts
testers to measure peel strength,
IE, 7/17, p.95
Surface analyzer (Meseran) does
many jobs, 12/18, p.29

Ampex Corp.: Digital tape transport feeds computers, IE, 10/16, p.58 Magnetic tape recorder, IE, 11/13, wo videotape recorders fit varying needs, IE, 12/4, p.82

Amsted Industries Inc.: May buy Macwhyte, 7/24, p.31

Anocut Engineering Co.: Electrolytic power for grinding job, 10/2, p.17

API Instruments Co.: Multipurpose epoxy adhesive, IE, 9/18, p.136

Apex Welding Inc.: Crane dumping buckets, IE, 10/16,

Applied Power Industries Inc.: Power-Packer line of portable air piston pumps for cylinder actua-tion, IE, 12/4, p.88

Applied Research Laboratories Quantometer checks nine samples at once, IE, 10/16, p.56

Aqua-Chem Inc.: Desalting plant, San Diego, 9/4,

Arco Welding Mfg. Co.:
Prewelded step cleans painted steel, Vacu-Blasting, 9/18,

Aremco Products Inc.: eramic adhesive holds thermo-couples, IE, 8/7, p.91

argus Research Corp.; Dil industry faced with clean air problem, 12/11, p.138

Armco Steel Corp.:
Base prices reduced on long terne steel, 12/11, p.23
Coating line converts from one metal to another quickly, 12/18, p.32

p.32 Continuous coating line, Ashland, Ky., Wks., 12/4. p.31 New precipitation hardening stain-less, PH 13-8 Mo, 8/14, p.31 To build 86 in. cold mill, 11/6,

Armstrong Rubber Co.: Buys five computers, 9/4, p.17

Aronson Machine Co. Inc.: Separable roll-wheel units, IE, 8/14, p.79

Arwood Corp.: Aluminum casting alloy vies with titanium, Arcast A67, 8/21, p.23 Investment castings plant, \$3 mil-lion, 12/11, p.32

Atlantic Container Line Ltd.: Computer to control containership cargo, 8/7, p.84j*

Atlas Car & Mfg. Co.: Turntable car links BOF to con-tinuous casting, IE, 8/21, p.54

Aubin Co., A. E.:
Tumbling barrel, portable, IE,
10/16, p.60

Auerbach Corp.: EDP unit to match workers jobs, dev. for Labor De 7/17, p.21

Austin Tool Co.:
Boring bar-vibration damped, IE,
10/2, p.72
Vibration damper on milling arbors, IE, 8/21, p.57

Automation Development Corp.: Bar, tube feeder for Brown Sharpe units, IE, 12/4, p.88

Automation Industries Inc.: Sperry Rand ultrasonic data, IE, 7/10, p.70 signal

Autoquip Corp.:
Gondola dumper holds up to 6000
lb, 10/16, p.59

Aveo Corp.: Avec Corp.:
Labor contract rewards skills,
Lycoming Div., 7/17, p.23
Military hardware, computer design, 7/24, p.21

Avco Bay State Abrasives: Copperdyne wheel (electrolytic grinding), 10/2, p.17

Avnet Shaw Corp.: Shaw process coupled to EDM, 9/25, p.27

BTU Engineering Corp.: ual atmosphere furnace us fluid gate control, 10/23, p.19

Babcock & Wilcox Co.:
Air curtain is soaking pit cover,
Koppel plant, 9/4, p.25
Diescher tube mill revival, AISE
conference, 10/2, p.17
Explosive cladding interiors of
nuclear reactor vessels, 10/23,
p.27

p.27
Fabricating big nuclear pressure vessels, 11/13, p.56
Faster delivery for pressure vessel plant means buying from Japan, 10/23, p.21

Code: *-Metalworking Edition only; †-Metalproducing Edition only; IE-Industrial Equipment

Fragomen: Pollution control tax credit urged, 10/23, p.25
Hydrostatic bearings increase bore accuracy, IE, 10/30, p.80
Pressure vessel capability at Ind. plant, 10/16, p.19
Welding position, 350,000 load, tilt and rotate, 9/11, p.27

Bailey Co., William M.: Remote control on tap hole driller, IE, 11/20, p.118

Bailey Meter Co.: Portable data logger aids process analysis, IE, 10/23, p.84

Baird-Atomic Inc.: Acquires instrument line of Na-tional Spectrographic Lab, 12/18, p.32

Baldwin-Lima-Hamilton Corp.: Builds automated oil hydraulic forging press for Jorgensen, 7/31, p.48d

Ball Bros.: AZP continuous cast zinc strip, 7/17, p.83

Ball Screws Inc.: Lead screws have internal ball re-turn system, IE, 7/10, p.73

Barber-Colman Co.: Adhesive fits production needs (Eastman 910), 7/10, p.64

Barden Corp.: Merger with Fansteel considered, 12/18, p.32

Bardons & Oliver Inc.: Fluidics guide turret lathes, 7/17, p.29 and 7/24, p.66

Barkelew Mfg. Co.: Purchase by Square D, 12/11, p.32

Barnes Co., W. F. & John: Builds automated line for auto brake part production, 12/4, p.76k*

Console lights on machining line, IE, 11/13, p.91 Separate cutting tools complete seven machining operations, IE,

Barnes Engineering Co.: Infrared micrometer measures stock to 3.5 im., IE, 11/20, p.103 Optical system aids in error-free spectra, IE, 11/13, p.91

Baron Blakeslee Inc.: Freon solvent part of drying system, IE, 9/11, p.87

Barrett-Cravens Co.: Stand-up truck for narrow aisles, IE, 7/17, p.95

Barrett Electronics Corp.: Builds remote control train for airport traffic, 12/11, p.29

Bath Co., Cyril: Stretch former for Boeing's 747 jumbo jets, 12/18, p.59* Stretch former for ship hulls, 10/9, p.31

Bausch & Lomb Inc.:
Atomic absorption spectrophotometer, IE, 7/10, p.65
Balsonic units, multifrequency of sound waves cleans faster, 11/20, p.29
Houston Instrument: Digital plotter accepts ball point, fiber tips, IE, 12/11, p.120
Ronchi rulings, shelf items, IE, 8/14, p.78

Baush Machine Tool Co.: NC machining center, IE, 11/20, p.106

Beckman Instruments Inc.: Counters, controllers line, IE, 7/17, p.93

Beech Aircraft Corp.: Freezer retards alloy aging, IE, 12/25, p.43

Belden Corp.: Carney: Some copper users 90% dependent on imports, 12/25,

Bell Telephone Laboratories:
Alloy aids computer memory (cobalt, iron and gold), 9/25, p.29 and 11/13, p.25
Holograms, more depth through new technique, 10/23, p.27
Microwave terminals portable, phone call emergency, 7/31, p.21 Quick freeze improves ceramics, 7/17, p.29

Bendix Co.: Acquires Federal-Mogul, 12/25,

p.13 Crushtrue multiform grinder, IE, 10/23, p.83 Jig time positioning, Cordax

Jig time positioning, Cordax measuring system, 7/10, p.64 NC market shifting (STEEL Feature), 9/11, p.57 New line of positioning and simple contouring NC system, 8/21, p.24 X-ray gazing

K-ray gaging faster with line of Sheffield Measuray series, 11/27,

Beryllium Corp.: Beryllium added to copper-nickel

Beryllium Corp.:
Beryllium added to copper-nickel
alloy for underwater hydrophones, 10/9, p.58ggLong-length beryllium sheet with
new rolling tech., 9/18, p.29
Patented passivation process,
thwarts chemical attack, 8/28,
p.28
This protective coating patented.

Thin protective coating patented, 7/24, p.27

Bethlehem Steel Corp.:
Acquires Kayford Div. of Oglebay
Norton. 7/3, p. 22
Black light spots flaws in fasteners (nuts-bolts inspection at
Lebanon plant), 7/10, p.64h*
Directo-Matic control on slabbing
mill, Burns Harbor, 8/14, p.72g*
Dust suppressed in iron ore dumping areas using spray nozzle

Just suppressed in fron ore dumping areas using spray nozzle system, 12/25, p.14 Hot iron measured continuously by lance, 7/31, p.21 New alloy plate, RQ-100B, 10/2, p.25

p.25 San Francisco shipyard, arc weld-ing equipment carried on ele-vated track, 8/14, p.31 Shipping container-rail car, 8/14, p.98

p.98 Slotted bolts end need for backup-man, IE, 11/20, p.116

Centrifugal pumps for paint guns, IE. 11/13, p.87
Electrostatics control paint overspray, IE, 7/10, p.67

Black & Decker Mfg. Co.: Air tool market of portable pneu-matic tools for metalworking markets, low cost line, 9/18,

Black-Clawson Co.: Plate edge mill does planer's work, IE, 10/30, p.86

Blackstone Ultrasonics Inc.: Small ultrasonic cleaners, IE, 7/24, p.70

Bliss Co., E. W.: 2500 ton forging presses installed at Ford plant, 11/20, p.87 Can end press introduced, 12/25, p.14 [ay merge with Gulf + Western, 9/11, p.19]

Blue Giant Equipment Corp.: Custom lift table, IE, 12/11, p.110 Rider truck line, IE, 9/11, p.95 Walkie lift trucks, IE, 7/31, p.53

Blue M Engineering Co.: Ovens have control system variety, IE, 12/11, p.120

Bodine Electric Co.: Motor control limits heating, load problems, IE, 10/30, p.85

Boeing Co.: Challenge to planning, ment to meet aeros ment to meet aerospace de-mands, 10/16, p.50

Computer system 70 offers com-plete control of NC, 10/16, p.48

Computer design of three dimen-sional cams for fuel control, 747, 8/28, p.25

Computer innovations for tomorrow, pilot efforts in tapeless NC, 10/16, p.49
Fluidized bed for applying protective coatings to refractories, three step process, 11/6, p.27
German machine, vertical boring unit, 10/9, p.32
Orders eight NC profilers from Cincinnati Milling, 10/23, p.31
Punched tapes checked with plastic device dev. by F. L. Odle, 12/18, p.27
SST: A market for 4 million fasteners, 12/4, p.115
SST center wing structure contracted to Avco, 7/10, p.23
SST orders total 129, 7/24, p.21
Silver plating helps diffusion bonds, dissimilar metals, 8/7, p.27

p.27 Stretch former—747 jumbo jets, built in France, 12/18, p.59* Titanium floor panels to replace aluminum, test on Trans World Airlines, 12/4, p.76b*

Bonner & Moore Associates: Omega package for Univac, linear program computer, 12/4, p.76f*

Booz, Allen & Hamilton Inc. Business overseas, survey,

Borg-Warner Corp.:
4,000 ton clamp capacity injection molding machine reported by Porter, ABS plastics production, 8/21, p.13
Marbon Chemical: Autos get plastic parts, 9/4, p.25
Marbon Chemical epoxies bond plastics to substrates IF, 7/10

arbon Chemical epoxies bond plastics to substrates, IE, 7/10,

Plastic refrigerator, 12/4, p.117

Bossert Mfg. Corp.: Urethane forming makes a better steel brake band, 8/7, p.84b*

Bostitch Div.: Spanish venture, 12/11, p.31

Bowles Engineering Corp.: New fluidics system tr adaptive control task tried task, 9/18

Braner Engineering Inc.: Coil car and coil tipper of in unit, IE, 7/24, p.70 combined

Branford Wire & Mfg. Co.: Bright finish for stainless wire, IE, 8/28, p.86

Branson Instruments Inc.: System for water removal, IE, 7/31, p.50

Branson Sonic Power Co.: Ultrasonic unit handles assembly of plastics, IE, 12/4, p.99

Broken Hill Pty. Co. Ltd.: Builds steel plate plant, Kemble Wks., 11/13, p.32

Brooks Instrument: See Emerson Electric

Brown Boveri Corp.: Builds giant turboset for TVA, 7/10, p.91

Bruning Co., Charles: Whiteprinter (470 chemical diazo), IE, 11/20, p.103

Brush Instruments: See Clevite

Bucyrus-Erie Co.: Hydraulic crane has special hoist-ing unit with controlled free fall, 12/11, p.94b

Budd Co.:

"Daily double" saves space, boosts production, Detroit automotive plant: Two-line painting system, 10/23, p.72

Electroformed punch, moldmaking tech., 7/3, p.40

Postage stamp gages measure strain, IE, 10/16, p.58

Recording scanner, ultrasonic testing, IE, 8/7, p.92 Budd Co.:

Buhr Machine Tool Co.: Unit machines 'spiders,' IE, 10/30, p.80

Unit mills-drills cylinder blocks, IE, 8/21, p.56

Bullard Co.: Markets German machines, 9/4, p.17

merger negotiations with White Consolidated, 9/11, p.19 and

10/16, p.19 Simplified tooling, Templa-Turn machines, IE, 7/10, p.66

Bunker-Ramo Corp.:
Computer control of NC machines, 10/9, p.25
Computer system 70 offers complete control of NC, 10/16, p.48
Integrated circuits score again in NC (STEEL Feature), 8/28, p.57
NC—standard feature, IE, 8/14, p.80

Burdette Oxygen Co.: Acquiring Squire Welding, 11/20,

Burroughs Corp.: Electronic accounting systems, IE, 8/28, p.83 Negotiating with Japanese firm, 11/,6, p.32

Bux-Shrader Magnetic Products: Electromagnets handle steel sheets, IE, 8/28, p.85

CEJ Gage Co.: Sine centers simplify taper inspec-tion, IE, 7/31, p.56

CF&I Fabricators Inc.: Buys equipment of Reinforcing Steel Dept., 11/27, p.24

Cameron Iron Works Inc.: Raises prices on vacuum melted metal, 11/13, p.97

Camloc Fastener Corp.:
Merger negotiations with Rex
Chainbelt, 7/24, p.31; 8/21,
p.24; 11/20, p.32

Cammann Mfg. Co. Inc.: Two tables on metal disintegrator, IE, 9/25, p.81

Canoga Electronics Corp.: Midget TV camera for industrial jobs, 12/18, p.56d*

Carboline Co.:

Epoxy-polyamide coating, IE, 9/18, p.128
Zinc primer, cathodic protection, IE, 11/27, p.82

Carborundum Co.:
Acquisitions listed, reasons for purchase outlined (global planning), 9/11, p.69
Corporate planning scans the globe: Wendel, 9/11, p.66
Materials breakthrough sought in joining KT silicon carbide and weaving boron nitride, 7/31, p.19
Siliconized boron carbide better

shock, wear resistance, 7/24, p.25

Silicon carbide as auxiliary fuel adds flexibility to BOF, 8/7, p.84e*

p.84e* Tip for aluminum scrap melting, IE, 12/25, p.42 Tysaman Wks., new head design for abrasive cutoff unit, chart for scheduling work, 7/31, p.48

Carpenter Steel Co.:
Merger with Eastern Stainless
turned down, 7/3, p.22
Nuclear reactors, alloys for future
design, 11/27, p.20

Carrier Air Conditioning Co.: Air conditioner thermostat redesign, feature is plastic Celcon, 12/18, p.47 oam packing cuts weight (spag-hetti-plastic strands), 9/25, p.53

Casting Material Co.: Gazal process, porous plug system improves iron, 10/9, p.58q*; and 11/6, p.63

Casting Supply House Inc.: Slurry mixing tank, IE, 12/11, p.110

Caterpillar Tractor Co.: Inertia welding equipment for job shops, 9/18, p.99 Merger with Chicago Pneumatic Tool, 11/27, p.27

Ceco Corp.: Acquiring Southern Electric Steel, 10/9, p.31

Celanese Corp.:
Redesign of air conditioner thermostat, one feature is Celcon plastic, 12/18, p.47
Warm forged plastic parts, process tried by Ford, 7/17, p.21

Cermex Corp.: Acquired by 12/18, p.32 Frenchtown/CFI

Cerro Corp.: Merger negotiations with Pickands Mather terminated, 7/10, p.32

Cerro Copper & Brass Co.: Cerrobrass puts ton-a-minute ex-trusion press on stream (Belle-fonte, Pa., Wks.) STEEL Fea-ture, 11/20, p.57 ture, 11 Extrusion Extrusion press near start-up, 9/11, p.25 Indium solder, 11/20, p.29

Champion Screw Co.: Washer-dryer cleans fasteners, 9/18, p.25

Char-Lynn Co .: Hydraulic motor design, IE, 10/2, p.73
Pneumatic motor, Orbitaire, IE, 11/6, p.77

Chicago & North Western Railway Co.; Builds iron ore terminal, 7/24,

Chicago Pneumatic Tool Co.: Merger with Caterpillar Tractor, 11/27, p.27

Chromalloy American Corp.: Corrosion resistance in machinable carbide, IE, 7/17, p.93

Chrysler Corp.:

A look at turbines, electric cars, test equipment, 9/11, p.35
Huebner before Senate antitrust committee: Turbine engines replacement of piston engines, 10/16, p.54n*
Integrated circuits in cars coming: Bogan, 9/11, p.37
Photogrammetry abandoned (clay model to die automation programs), 9/11, p.37
Plastics report by Twiss, 12/18, p.46

p. 46
Salary increases, UAW agreement,
12/4, p.21
V-8 engine, aluminum-tin alloy
main bearings, 11/27, p.22

Cincinnati Lathe & Tool Co.: Bentley: How a market determined a machine, 12/11, p.84

Cincinnati Milling Machine Co.:
Adaptive controllers narrow sensor search, 10/16, p.43
Capital expenditures next seven years, 11/20, p.32
Bigger ECM slated, 40,000 amperes, 8/7, p.27
EDM diemaking machine for Mt. Vernon, 8/14, p.57
Plastic injection molding machine business eyed, 12/11, p.27
Shaft turning machine via NC designated CTC, 11/20, p.21; and IE, 12/4, p.82 Cincinnati Milling Machine Co.:

Cincinnati Shaper Co.: Cylinder modification for press brake, IE, 7/24, p.65 Hydraulic press brakes, form 60 ft plate, IE, 9/11, p.84

Cincinnati Sub-Zero Products Inc.: Three bath refrigeration cabinet, IE, 10/9, p.170

Clark Equipment Co.: Lift truck turning radius, IE, 8/28, p.86 Narrow alsle truck, pulsing cur-rent of solid state control, IE, 7/10, p.70 Tractor loader, IE, 9/11, p.84

Clay-Adams Inc.: Furnace brazing seals blood cell washer joints, 10/30, p.72a*

Clayton Mfg. Co.: Portable boilerroom, IE, 9/25, p.85

Clearing Div.: See U.S. Industries

Cleereman Machine Tool Corp.: ndex machine simplifies pump-making, IE, 12/4, p.96

Cleveland Crane & Engineering Co.: SCR drive on 150 ton crane, IE, 7/3, p.48

Cleveland Electric Illuminating

Co.:
Brooksieker: Cryogenically refrigerated copper and aluminum electrical transmission line in future, 9/4, p.27

Cleveland Farval: See Eaton Vale

Cleveland Worm & Gear Div.: See Eaton Yale & Towne

Clevite Corp.: Portable recorder on rolling mill checkout, IE, 9/11, p.87

Climax Molybdenum Co.: Urad Mine, Colo., dedication, 9/25, p.21

Colonial Broach & Machine Co.: Ford to get mechanical broaching system, 11/13, p.29

Combustion Engineering Inc.: Acquiring Mississippi Glass, 10/30, p.31 Merges with Ramtite, 8/14, p.25

Continental Aviation & Engineering Corp.:
Turbine engine for Howmet race car, 11/27, p.31

Continental Hydraulics Inc.: Low current control for solenoid valves, IE, 7/10, p.68

Continental Steel Corp.: Acquires Enterprise Wire, 12/4,

Controls Co. of America:
Air cooled condenser fan motor,
IE, 8/14, p.81
Automated molding machines boost
output of timer cams and auto
switch cases, 11/13, p.84
Spanish operations announced,
12/11, p.31

Conveyors & Dumpers Inc.: Selective batch dumper, IE, 9/4, p.71

Cooper Electroheat Ltd.: Mobile stress relieving furnace mounted on tractor trailer for welding jobs, 10/23, p.19

Cooper Industries Inc.: Merges with Waukesha Motor, 8/7, p.32; 8/28, p.32 Merging Lufkin Rule, 10/9, p.32

Copper Kange Co.:

Boyd tells progress of firm from 1959 to 1960: How Copper Range is digging out (STEEL Feature), 10/16, p.37

Covel Mfg. Co.: Grinders fit production, toolroom use, IE, 8/7, p.93

Croname Inc.:
Decorative metal designs via machine, 7/3, p.21

Conrac Corp.:
Datex Div. NC guides airframe tape layer, IE, 10/2, p.63

('rane Packing Co.: Model 96 Lapmaster fits to extra large parts, IE, 8/14, p.78

Cross Co.: Cross reports machine tool controls: Computer next, then automatic testing and automatic assembly, 9/11, p.78

Feed Pak units on Transfer-Matic (cases machined in one pass), IE, 7/3, p.50
Transfer line for foundries, IE, 10/2, 71 10/2, p.71 nit finishes valve seats, IE, 8/21, p.55

Crouse-Hinds Co.: Shielding advised for computers, instruments, 8/7, p.84k*

Crucible Steel Co.:
Automatic bar heat treating line,
computerized process control,

Automatic bar heat treating line, computerized process control, 11/6, p.57

Constructs tube mill, Midland Wks., 10/2, p.23

Continuous casting machine construction delayed, 8/7, p.32

Cuts capital budget, declining profits, 9/18, p.25

Lobb opposes steel import quota, 12/25, p.11

Powder metallurgy breakthrough, new developments, 12/11, p.19

Reactive metal-protective coating, 9/11, p.31

Soft stainless 'Rezistal.' easy forming and cutting, 7/3, p.17

Titanium alloy, Beta III, studied, 12/18, p.27

Custom Machine Inc.:
Ultrasonics inspects pipe seam
welds, IE, 11/20, p.114

Cutler-Hammer Inc.: Acquires FMA Inc., 7/3, p.22 Exhibits new controls, IE, 11/13, Powereed reed switch, IE, 10/30, p.80

Thayer Scale: Solid-liquid batching system, IE, 9/25, p.80

 \mathbf{p}

Danly Machine Corp.; Acquires stock in Onsrud, 8/28, p.32

Dayton Malleable Iron Co.: Annealing furnace combines steps for quality, speed, 8/7, p.77

Deere & Co., John: Australian assembly plant, 9/25,

Denison: See Abex Corp.

Dennis Chemical Co.: Organosols for coil coating and metal finishing, 11/20, p.29

Detroit Broach & Machine Co.: Broach fixture modification, IE, 10/23, p.82
Steel knuckles machined fast with hydraulic tracer lathe, 7/3, p.22
Tracer lathe roughs, finishes axles, IE, 8/21, p.51

Detroit Hoist & Machine Co.: Radio control avoids hoist-cable problems, IE, 11/6, p.77

Detroit Tap & Tool Co.: Threading operations on Lo-Swing lathe equipped with rolling at-tachment, 8/21, p.50a*

Devine Mfg. Co., J. P.: Fluid bed dryer of side entry de-sign, IE, 9/25, p.80

DeVlieg Machine Co.:
Jigmil-tape control machines pair
of printing press side frames of
boiler plate steel, 8/21, p.50h*
Jigmil-tape control machines
large cast iron speed reducer
gearboxes, 10/23, p.74k*

Di-Acro Div.: See Houdaille

Diamond Alkali Co.: Buying polypropylene resin and film plant from Alamo Indus-tries, 7/31, p.21

Dickey & Son Machine & Tool Co. Inc.: Machine beads, flares, flanges, balls tube ends, IE, 7/17, p.91

Diecraft Inc.: Ultrasonics cleans microscope parts faster, 11/20, p.102m*

Dixon Automatic Tool Inc.: Coil lift device fits fork trucks, IE, 9/4, p.71

Dodge Mfg. Corp.: Air clutch sheave, IE, 9/4, p.75 SCRs control motors, IE, 8/ p.91

Doehler-Jarvis Div.: Bearing surfaces, transplant coating system, gets ASM award, 10/23, p.19

Douglas Aircraft Co.: Air cargo system sought, 7/24, p.31

p.31
Five copy milling machine order from Droop & Rein, Germany, 11/27, p.20
Stainless brazing debuts for aircraft fittings, 11/6, p.60
Turbine engine design combines steam and gas (Feher Cycle), 9/25, p.31

Dow Chemical Co.:
Discontinues manufacture of polypropylene, 10/2, p.23
Gas chromatograph aids plants in air pollution, 10/30, p.25
Pelaspan - Pac, spaghetti - like strands for foam packaging, 9/25, p.53
Simplified method for preparing metallographic samples, 7/24, p.31

Dreffein Engineering Co.: Builds automatic bar heat treat facility for Crucible, 11/6, p.57

Dresser Industries Inc.: Merger with Harbison-Walker, 9/11, p.25; approved, 11/6, p.32

Drill Draulie Inc.: Compact machining unit, all hydraulic feed and traverse system, IE, 12/4, p.86

Driver Co., Wilbur B.: Sold to Sylvania, 8/7, p.32

Driver-Harris Co.: Rod rolling mill under construc-tion in N. J., 9/11, p.27

Duff-Norton Co.: Motorized trolleys, IE, 8/21, p.56

Dun & Bradstreet Inc.:

Pusiness instruction Survey: Business needs, 7/3, p.15

Du Pont de Nemours & Co. Inc., E. I.:
Chromium dioxide key ingredient
in magnetic tape, 12/18, p.64
May sell Metals Center to Fansteel, 10/30, p.31
Plastic clamps for soldering, resilient pads of Viton, 7/31, p.22

Dynasonics Corp.: Ultrasonic cleaning unit has dual tank, IE, 7/31, p.52

Easco-Sparcatron Inc.: EDM for high stock removal, IE, 11/20, p.116

Eastern Stainless Steel Corp.: Merger with Carpenter Steel called off, 7/3, p.22

Eastman Chemical Products Inc.: Adhesive fits production needs, 7/10, p.64

Eastman Kodak Co.: Recording film usable at high speeds, IE, 8/14, p.80

Eaton Yale & Towne Inc.:
Acquiring Automated Handling
Systems, 12/11, p.32
Acquiring Timberjack Machines,

Acquiring Timberjack Machines, 8/28, p.32 Cleveland Farval: Centralized lube

system used for Inland's straddle carriers (hot steel coils), 8/14, p.72h*
Cleveland Worm & Gear: Desurger ends pulsation, shock problems, IE, 12/4, p.98

Gas lift truck, IE, 10/16, p.60 Gas truck lifts 3,000 lb, IE, 8/19, p.12?

Microelectronics add to drive-brake application, IE, 9/4, p.74 Telecomputer Center, Eastlake, Ohio, 10/30, p.32 Variable speeddrives, IE, 9/18, p.130

Edgewater Steel Co.: Acquires Jerden Mfg., 9/11, p.25

Egan & Co., Frank W.: Coil handler, IE, 11/6, p.73

Ekco Electronics (England): Portable metal analyzer, 9/4, p.19

Elb Grinders Corp.: Planer type surface grinder, IE, 7/24, p.68

Electric Soldering Iron Co.: Holder for miniature soldering, IE, 10/2, p.71

Electro-Optical Systems Inc.: Searchlights more powerful, 10/16, p.19

Emerson Electric Co.: Brooks Instrument Div. to acquire Fairhurst Electronics Ltd., 11/6, p.31 p.31 Digital process controller, IE, 11/6, p.75

Enterprise Machine Tools Inc. tepless spindle speed variation, IE, 10/30, p.86

Enthone Inc.: Surfacing conditioning system for plating lines, 8/14, p.68

Equipment Mfg. Inc.: Automatic sheet stacker, IE, 7/3, p.47 neet metal stacker, IE, 11/20, p.104

Erie City Iron Works: Builds autoclave (100,000 lb.) for Aeronca for bonding adhesives, 11/13, p.29

Erie Forge & Steel Co.: Electric melt shop, payoff, 7/24, p.64d*

Erie Marine Inc.: Builds shipyard, Erie, Pa., 9/25, p.27

Eriez Magnetics

Eriez Magneties:
Forum on pollution: Magnetics answer call for new ideas in pollution fight. 10/9, p.27
Magnetic handler cleans scrap for detinning, 12/25, p.31
Magnetic racks added to overhead conveyor, 8/21, p.50a*
Waste disposal project with Pennsylvania county commissioners, 8/14, p.72b*

Essex Wire Corp.: Dime size thermostats tested by computer, 12/25, p.16

Esso Research & Engineering Co Soil and petroleum binder fo building block, 7/24, p.27

Etteo Tool & Machine Co. Inc.: Drill head redesign, IE, 7/17, p.95

Ex-Cell-O Corp.:

Buys Kent-Owens Machine Co., 12/11, p.32

Contour projector, 14 in. screen, IE, 10/30, p.84

NC work center has four axis capability, machines toolholder carriers, 11/6, p.60

Standard NC center, IE, 11/13, p.87

 \mathbf{F} Fafnir Bearing Co.: High speed bearing tailored for rigidity, IE, 12/4, p.82

Falk Corp.: Acquires interest in Polyspede Electronics, 12/4, p.31

Fansteel Metallurgical Corp.:
Buying du Pont's Metals Center
in Baltimore, 10/30, p.31
Buying Precision Sheet Metal,
10/23, p.32
Merger with Barden studied,

Merger with 12/18, p.32 Tantalum ca

Tantalum capacitors cost cut, 12/11, p.29
Tantalum foil in 42 inch widths, IE, 7/31, p.50

Farrel Corp.: Automated filing systems save time, girlpower, 11/6, p.70d* Ball mill for gear manufacture, 10/16, p.22

Faustel Inc.: Coil coater, IE, 9/11, p.89

Fawick Corp.: Valve features metered flow, IE, 9/11, p.84

Federal-Mogul Corp.: Acquired by Bendix, 12/25, p.13 Buys assets of National Grinding Wheel, 7/24, p.31

Federal Pacific Electric Co.: Electrocoating winning production line jobs, Vidalia, Ga., 11/6.

Fellows Gear Shaper Co.: Product managers, shift product sales managers, managers,

Felt Products Mfg. Co.: Lubricant ends galling with tanium, stainless, IE, 11 11/20,

Ferranti Ltd.: Batch manufacturing system for small parts cuts machining la-bor costs, 11/20, p.62

Ferro Dynamics Corp.: Flying cutoff electronically programmed, IE, 12/18, p.63

Ferry Cap & Screw Co.: Cold extrusion seminar in nance production, 8/7, p.70 ord-

Fiat: See Russia (auto plant)

Fibersteel Co.: Ferrocement process—Fibersteel, floating buildings, 10/9, p.58j*

Firth Sterling Inc.: Electroflux remelt furnaces, 7/31, p.40

Fisher & Forter Co.: Electroclad refractories licks corrosion, 10/9, p.59u

Fischer & Co., H. G.: Safety device aids electrostatic spray, IE, 10/9, p.168

Fischer Industries: American Monorail parts finishing machine, IE, 7/3, p.50

Flame Industries Inc.: Inertia welding for job shop, 9/18.

Foote-Burt Div.: Purchased by Reynolds Metals, 11/20, p.32

Ford Motor Co.: 1st quarter '68, overtime to counteract strike loss, 11/27, p.30 Adaptive welding control use, 11/13, p.39

Adaptive welding control use, 11/13, p.39

Agriculture 2000, future tractors, 10/16, p.15

Aims at collapsible front, steel added to underbody, 9/4, p.23

Arjay Miller: Systems analysis for solution of social problems (addresses NICB), 12/11, p.21

Ausformed front leaf springs, 10/2, p.21

Ausformed steel, improved fatigue properties, uses, 10/9, p.58n*

Auto price hike a certainty (Iacocca), 9/4, p.17

Can Ford make up 500.000 'lost' cars? UAW strike, 11/6, p.35

Canton forge plant: Innovate, automate, invest—a captive forger competes, 11/20, p.83

Canton forge plant, gas-fired slot furnaces, 11/20, p.89 EB welding, Livonia, Mich., line, 8/21, p.17

Electropainting lines, 7/10, p.35 Enlarges Cleveland engine plant, 9/11, p.25

9/11, p.25 Gear rolling replaces shaving, co-operates with Landis Machine in design and production of TRF gear rolling machine, 9/11, p.71 Lincoln-Mercury, may lead sales,

Lincoln-Mercury, may lead sales, 9/4, p.30
Mechanical broaching operation, 11/13, p.29
Mustang is loser, Camaro success, 7/24, p.37
Plastics p'ant, Saline, Mich. (STEEL Feature), 12/18, p.41
Recruiting centers-inner city hiring program, 11/6, p.37
Safety's impact on suppliers, 9/25, p.38

Safety's impact on suppliers, 9/25, p.38
Steel Div., new slab mill and hot mill, 8/21, p.24
Steel price hikes add \$2 per car to costs, Ford reports, 12/25, p.12
Urban Affairs Dept. formed, Denman manager, 8/14, p.21
Voltage regulator exhibited, 12/18,

Warm forged plastic parts (dev. by Celanese) experiments, 7/17,

Formsprag Co.: Chromizing 'pink phase' process to reduce wear, extend com-ponent life (metal diffusion al-loying tech.), 8/21, p.48

Foseco Inc.: Paint resists erosive force of liq-uid metals, IE, 7/3, p.49

Foxboro Co.: Analog backup for direct digital control, IE, 11/6, p.73

Fusion Inc.: Automatic soldering system, 7/10, p.64 p.64 p on brazing concentricity, 12/18, p.47

G

General Broach & Engineering Co.: Table top broacher, IE, 11/20, p.110

General Corrugated Machinery Co.,

Inc.: Automatic stacker loads boxes on pallets, IE, 7/3, p.50

General Dynamics Corp.:
Automatic pipewelder forecast, 10/9, p.29
High pressure forming device induces pulses (Imp), 12/4, p.29
Profiler milling machine, capacity falls behind, 10/9, p.19
Research subs for underseas, 11/6, p.98

Shot peeners work on F-111 bomb-8/14, p.32

General Electric Co.:
Appoints to new 'president's office', 11/27, p.27
Borch: Forecasts price hikes for appliances, 12/25, p.12
Computer monitors expressways, rush hours, 11/13, p.27
Computerized machinability program with Rocketdyne, 10/30, p.62

p.62 Crewless electric train built for Muskingham railroad, 10/9, p.25 Directo-Matic control for Bethle-hem mill, 8/14, p.72g* Electronic component prices fore-cast by Maier and Lee, 12/25,

Electropaint machine

Electropaint machine (Udylite's Cyclemaster) installed at Salem, Va., plant, 7/10, p.55 Expands foundry Dept., Schenectady, 11/27, p.27 Family of fluidic amplifiers, IE, 11/27, p.79 Ferrous diecasting, Lamp Metals & Components Dept. (going for the home stretch), 7/24, p.54 Ferrous diecasting tried on production parts at Wabco, 10/16, p.21

Leasing computers, contract with Systems Capital, 12/11, p.32
Isostatic pressing research, nuclear operation, 8/28, p.28
Metalliding, new system for surface coating (electrolytic diffusion process), 7/3, p.37
Miniature strand annealing furnace duplicates steel mill, Pittsfield, Mass., lab, 10/23, p.31
Patent for computer system, metal rolling mills, 8/7, p.32
Process control markets developed (market trend), 11/27, p.96
Process control markets developed (market trend), 11/27, p.96
Process control reported by Williams, 7/3, p.13
Ross: NC's potential lies in integration, 7/3, p.14
SCR drive concept on 150 ton crane, IE, 7/3, p.48
Surface analyses tool dev. by Dr. Harris: Secondary electron spectroscopy, 8/21, p.50f*
Systems approach (Tempo) used for long range planning, 8/14, p.64
Silicone-based coatings for aerospace, 8/7, p.84e*

p.64
Silicone-based coatings for aerospace, 8/7, p.84e*
Transformers tied down for rail shipment, 8/14, p.72b
Watts (Missile & Space Div.):
When to shelve a project, 8/28,

X-rays gage strip, IE, 7/10, p.70

General Logistics Corp.: Conveyor-vacuum belt stacks stainless sheets at end of shear-ing line, 9/18, p.29

General Motors Corp.:
Automation: UAW issue or 'smoke screen'? 12/11, p.43
Canada-U. S. auto pact, personnel dislocations more severe in Canada, 9/4, p.19
Chevrolet Bay City plant: Computer controls power and free conveyor, 11/6, p.58
Chevrolet plant uses flexible conveyor, controls 47 axle types, 12/4, p.76d*
Curved chrome on auto trim reduces glare, 10/23, p.24
Electropainting lines, 7/10, p.35
Elects Roche chairman, Cole president, 11/6, p.31
Emission levels reduced with turbine combustion system, lessens pollutants, 11/13, p.23
Hydra-Matic Div.: GM's second tech center (STEEL Feature), 7/3, p.33
Hydra-Matic Div.; warm forging of pinion blanks saves on scrap, 9/11, p.29
Hydrodynamic sealing element reduces oil leaks, 11/20, p.27

9/11, p.29
Hydrodynamic sealing element reduces oil leaks, 11/20, p.27
Noise eliminated from rotating parts, 'white noise', 10/16, p.25
Plastic plants boom, 12/18, p.42
Pontiac emphasis on electrical systems for '68, 9/18, p.35
Pontiac gets solid state regulator, 8/28, p.23
Trucks get plastic tanks, 8/28, p.25

General Refractories Co.: Buys assets of Ohio Lime, 8/14, _ p.25 Buys Furneo Construction, 9/11, p.27

Refractory suited to severe conditions, IE, 9/18, p.136

Giannini Scientific Corp.: Plasma spraying epoxies, IE, 7/10, Plasma spray gun, IE, 7/17, p.92

Gibson Machine Co.: Machine combines production and toolroom grinding, 9/18, p.126f*

Giddings & Lewis Inc.: Acquisition of Scottish firm, 12/11, p.31

Gilmore Steel Corp.: Steel complex for Oregon adjoined by Midland-Ross pellet facility, 11/6, p.31

Gisholt Machine Co. Div.: Automatic threading lathe, IE, 11/13, p.85 Lathe reduces thread cutting time, IE, 9/4, p.69

Glidden Co.: Merger with SCM approved, 9/18,

Goodyear Tire & Rubber Co.: PeopleMover displayed at Disney-land, 7/10, p.23

Gorton Machine Corp.: Revisions in turret milling unit, IE, 12/4, p.84

Grace & Co., W. R.: Dearborn Chemical material separates emulsion components, 8/21, p.54

Granite City Steel Co.: Opens 80 in. hot strip mill, computer controlled, 8/14, p.61

Grant Mfg. & Machine Co.: Spinning type riveter, IE, 8/28,

Green Refractories Co.: Buys shares in Australian firm, 8/14, p.25 Merged with U. S. Gypsum, 12/4,

Gregory Industries Inc.:
Buying shares of Feedmatic-Detroit, 11/6, p.31
Nelson portable unit welds studs to light metal, IE, 9/4, p.70

Gries Reproducer Co.: Diecaster, 80 parts per minute, IE, 8/28, p.83

Plastic parts molded in one step, Intermold tech., 9/18, p.29

Grimm & Co., W. T.: Merger activity report, 7/24, p.23

Grip Nut Co.: Gripco Grade B Crownlock nut, IE, 7/10, p.68

Gripall Corp.: Grab grips drum, adjusts to size, IE, 7/10, p.74

Grumman Aircraft Engineering Computer speeds order flow. 12/18, p.58
Polished boron filaments stronger, 7/17, p.29

Gulf & Western Industries Inc.: May merge E. W. Bliss, 9/11, p.19 Merged with Universal American, 12/4, p.31

Gulton Industries Inc.: Ultrasonics aids wire drawing and cleaning, IE, 12/4, p.81

H

H & H Thermostats Inc.: Redesign of air conditioner thermostat, 12/18, p.47

H&H Wilson Operation: Milling machine, 8 spindle, 3 di-mensional bridge hogs steel tracks (AF C-5A wing flaps), 9/18, p.105

Hacker & Co. Inc., William J.: Wet grinder makes metallographic samples, IE, 7/3, p.53

Hamilton Precision Metals: TLC plates made on Sendzimir mill, 10/30, p.25

Hamilton Standard: See United

Hancock & Co. Ltd.: Flame cut tracker controls EB welder, 7/10, p.29

Hansen Mfg. Co.: Quick connecting coupling for ammonia applications, IE, 7/3, p.49

Harbison-Walker Refractories Inc.: Merger with Dresser Industries, 9/11, p.25; approved, 11/6 p.32

Hardman Inc.: rethane foam dispenser, 12/4, p.86 Urethane

Harnischfeger Corp.: Girder feature of packaged crane, IE, 9/18, p.127 SCR power supplies, IE, 11/13,

Harris Hub Co.: irless electrostatic spray halves paint use, 11/27, p.64

Harris Mfg. Co. Inc.: Metal treating freezer, IE, 10/2, p.66

Harrop Ceramic Service Co.:
Quench furnace has automatic
drop, IE, 12/25, p.44

Harvey Aluminum Inc.: Milt Beck predicts aluminum for transportation market,

Harvey Engineering Laboratory: Reports cryogenic liquid jets near heat zones improve aluminum welds, 7/10, p.29

Harwood Engineering Co. Inc.: Isostatic pressing equipment for GE, 8/28, p.28

Hauger-Beegle Associates Inc.: Epoxy-polyester for top coat production, IE, 11/20, p.114

Havir Mfg. Co.: 75 ton production press, IE, 11/6, p.76 ton production press, IE, 7/31,

Hays Corp.: Hamlett forecasts pollution con-trol equipment markets, 11/6, p.101

Heald Machine Co.: ID grinder for big parts, 12/11, p.27 Tracing attachment on internal grinders cuts costs, p.74f*

p.741° Tri-way machine cuts costs on complex flanges (valves, fittings, hydrants), 8/7, p.79

Heat Machinery Corp.: Air draw furnace has integral washer, IE, 10/23, p.80

Heidrick & Struggles Inc.: Executive demand, defense engineering and manufacturing (table), 7/31, p.15

Employing inmates (federal prisoners) solves manpower needs, 11/20, p.98b* Screw-lock inserts prevent loosening, 11/27, p.64

Hersey-Sparling Meter Co.:

poxy coatings protect flow meters, 10/9, p.60a*

Hewitt Associates: Computer reports benefits to each employee, 7/24, p.23

Hill Acme Co.: Hill Acme and Loma add parting machines, IE, 10/23, p.79 Hydraulic single end punch, IE, 8/28, p.87

Hillyer Corp.: Adaptation of Hillyermatic to Mark Century NC, IE, 10/23,

Hirschmann Corp.: Drill grinders, IE, 8/7, p.92 Fatigue tester, IE, 8/14, p.79

Hobart Bros. Co.: Rectifier welding power source, IE, 9/18, p.139

Hoeganaes Corp.: Russians preparing alloy powders via simultaneous reduction, 10/16, p.21

Honeywell Inc.:

rmy unit to get fluidic control using liquid rather than air, 12/4, p.25

Computer feature, circuit density, IE, 12/18, p.64 Inertia welding equipment cuts cost of producing ordnance part, cube carrier assembly, p.101 tube

tube carrier assembly, 9/18, p.101
Integrated circuits benefit memory system, IE, 10/30, p.82
Laser to cut data storage expense, 11/20, p.25
Micro Switch oiltight pushbuttons, IE, 9/11, p.93
Oculomotor system may control machines by eyeball, 8/14, p.27
Small computers, mass storage devices, 8/21, p.50d*
Time sharing engineer service via answering service, computer, 8/28, p.74*
Tracer control fits lathes, mills, IE, 7/17, p.93
Two computers geared to real time, IE, 10/16, p.55

Hooker Chemical Corp.: Merges Udylite, 11/20, p.32

Houdaille Industries:
Burgmaster machining center redesign, IE, 10/30, p.82
Di-Acro Div.: NC punch press designed for electronics suppliers, 11/20, p.90
Punch via computer control, IE, 7/31, p.51 and p.22

Houghton & Co., E. F.: Variable quench fluid, IE, 10/9, p.173 p.173 Wetting agent for spray nozzle, suppresses dust in iron ore dumping areas, 12/25, p.14

Houston Fearless Corp.: Automatic retrieval for micro-film, IE, 9/25, p.83

Houston Instrument: See Bausch

Howie Corp.: Switch responds to fluidic pressures, IE, 8/14, p.82

Howmet Corp.: Turbine car unveiled, 11/27, p.31

Hubbell Inc., Harvey Acquires Br 11/20, p.32 British motor firm,

Huber Corp.: Merger talk with Mid-Continent, Merger approved, 9/25, p.27

Hughes Tool Co.:
"Cookie cutter" for road excavation, 9/25, p.31

Hughes Aircraft Co.: Digital readout for tool position, IE, 7/17, p.96

Hull & Co. Inc., R. O.: Alkaline soak cleaner, IE, 9/18, Rosheene brightener for stainless,

Humber, Mundie & McClary: Company loyalty in new form, 8/7, p.23

Humostan Corp.: Flat stock lubricator eliminates overspray, 10/2, p.71

Humphreys Corp.: Tafa Div., induction heats gas streams to 5,000 F, IE, 11/20,

Douglas International Corp. Fone-O-Matic press, IE, 10/2, p.63 Wotan horizontal boring-milling machines long parts, IE, 12/11,

Hunter Engineering Co.: Builds continuous easter for zinc strip AZP, 7/17, p.83 Prestressed rolling mill design, 9/11, p.29

Hunter Spring: See Ametek Inc.

Hyde Park Electronics Inc.: Press impact sensor, IE, 10/16, p.59

Hydro-Cam Engineering Co.: Stampings made easy with progressive dies, 12/4, p.76f*

I

IRC Inc.: Merger with TRW discussed, 11/13, p.27

Imperial-Eastman Corp.:
Auto-Forge process (TMW) turns
out small brass plumbing elbows. 7/10, p.56
Pierce-forged alum:num studied
with Alcoa, 8/14, p.29

Imperial Electroplating Inc.: Surface conditioning pares plating rejects, 8/14, p.68

Indiana General Corp.:
Magnet traps tramp iron, Magnetic Div., 12/18, p.47

Industrial Cleaning Machines Inc.: ry honing machine, blast clean-ing large parts, IE, 12/11, p.120

Ingersoll Milling Machine Co.: Face mills, chatter-free design, IE, 11/6, p.77

Ingersoll-Rand Co.: MOVO series of air motors, IE, 7/24, p.68

Inland Mfg. Co.: Parts finishing machine, IE, 7/3, p.50

Inland Steel Co.: Expands sheet plant, Ind., 7/24, p.31

p.31 Philip Block new chairman, 10/30, oseph Block retires; industry re-calls his outlook for 2000, 11/6,

p.23 Straddle carriers for hot coils of steel use centralized lubrication system, 8/14, p.72h Vacu-Blasting: Prepainted steel sheet spot cleaned for welding, 9/18, p.112h*

Instadok Corp.:
Loading ramp adjusts to truck bed,
 10/16, p.21

Interlake Steel Corp.: Electronic weighing system for hot metal, 8/7, p.85 May combine with Pittsburgh Steel and Wheeling, 10/9, p.21 est plant processes pickle liquor with salt water, 11/20, p.27

International Alloys Inc.:
Meter identifies, sorts metals,
Ferretmeter, 11/27, p.64

International Business Machines

AEC Radiation lab gets data storing — photodigital system, 11/6, p.24
Computers control ferrite memory core making, 9/25, p.58
Early Bird satellite transmits massive business data, 8/7, p.84n*

p.84q*
Etchant is recovered, recycled, 9/11, p.27
Hologram construction from digital data, 11/27, p.24
Laser speeds prototype production, 7/24, p.58
Optical scanning for data input

Optical scanning for data input, eases bottleneck, 11/13, p.77

International Cold Storage Co.: Freezer retards alloy aging at Beech Aircraft, IE, 12/25, p.43

International Harvester Co.: Solar Div. installs automatic furnace, 10/9, p.32 Ultrasonic test system for Army gun barrels, 11/20, p.102m*

International Nickel Co. Inc.: Copper-nickel alloy for marine uses, IE, 12/25, p.43 Modernizes Welsh refinery, 7/10,

Stainless steels, new series 744X,

International Nickel Co. of Canada Ltd.: Opens R&D lab, Ontario, 9/25,

International Rectifier Corp.: Logic-Triac series, 200 ampere (SCR), 9/25, p.29 SCR for low cost, IE, 12/4, p.94

Ion Physics Corp.: Larger high power tubes sought, 12/11, p.29

Electrochemical car sensor, 11/20, p.31 carbon dioxide

Ipsen Industries: See Alco Stand-

Jet Propulsion Laboratory: Isostatic pressing of polymer bear-ings, 10/23, p.27

Johns-Manville: Insulating brick shapes free fur-nace designs, IE, 10/23, p.80

Johns-Manville Aerospace Prod-Refractory felt serves at 2,700 F, IE, 7/10, p.72

Jones & Lamson: See Waterbury

Jones & Laughlin Steel Co.: lumina sleeve stops erosion of ladle stoppers at slag line, 7/31,

OF can produce high quality stainless, 300 and 400 series made by LAM process, 11/13, p.19

Housing entry, low cost units, 9/25, p.23 Stephens: Steel strike defies logic,

12/18, p.19
Stephens: Steel import quotes, 11/20, p.21

Jorgensen Co., Earle M.: B-L-H builds automated oil-hy-draulic forging press, 7/31,

Joy Mfg. Co.:
Acquiring Denver Equipment,
11/6, p.32
Key problems in foreign countries
for U. S. firms seeking business
overseas, 11/20, p.25

К

Kaiser Aluminum & Chemical Corp.: Aluminum welded to steel, ductile

Aluminum welded to steel, ductile insert, 8/7, p.21

Applies advanced technology—streamlines production-marketing units (White reports), 8/28, p.60

Building can plant, San Francisco Bay area, 11/6, p.90

Continuous heat treat line, aluminum sheet rides on air through furnace, 10/2, p.25

Nickel supply, joint effort with French firm, by 1970, 9/25, p.21

Kaiser Engineers:
L-D oxygen steel production to top open hearth by 1970, meets 172 standards, 8/14, p.31
Survey on BOF furnaces: U. S. and Japan vying for leadership,

10/9, p.23 USWA-Kaiser review sharing plan

possible amendment, 10/2, p.17
Western states (seven) consumption of steel products, report, 7/10, p.81

Kaufmann Tool & Engineering Corp.:

Urethane pressure-forming ma-chine built for Bossert, 8/7, p.84b*

Urethane punch for pressure forming garden tractor fenders, 8/28, p.29

Kawecki Chemical Co.: Buying assets of National Metal-lurgical, 9/11, p.27 Vacuum metal deposition, new plasma spray, 10/30, p.31

Kearney & Trecker Corp.: Bronze continuously cast from electric furnace ups fasteners' quality, 7/10, p.29 Lee Herda: Audits indirect bene-fits of NC machining, 7/17, p.69

Kelsey-Hayes Co.: Antiskid device, 8/14, p.21 Automated line turns out brake parts, 12/4, p.76k*

Kelvinator: See American Motors

Kennametal Inc.: Integral shank cutter, IE, 9/11, Lennon: Industrial diamond out-look, 11/20, p.27

Kennecott Copper Corp.: Building copper chemical manufacturing plant in Houston, 9/25, p.27

Keuffel & Esser Co.: Laser alignments may displace jigs, aircraft prototype, 7/10, p.31

Keystone Steel & Wire Co.: Maps building program, 10/16, p.21

Knight & Associates Inc., Lester

Computers and accessories, spending forecast by 1975-80 period, 11/6, p.99

Reports network of foundries use

a common computer, 11/6, p.24

Koehring Co.: Acquired Hydraulic Unit Special-ties, 12/11, p.32

Kolene Corp.: Salt bath processing, IE, 10/9, p.167

Korad Corp.: Green light laser penetrates under water, 7/17, p.31 Microvaporizer laser for spectro-graphic analysis, 8/28, p.64

Kozma Co., J. A.: Zinc holding furnace, gooseneck reduces shrinkage, IE, 7/31, p.50

Krasny & Associates Inc., Carl: Unit unscrambles part or shape problems, IE, 10/30, p.84

Krueger Co., H. R.: Special handles 15 axle housings, IE, 11/27, p.80

Krupp: See Germany

Kutais Auto Works: Adding electric heat to runners from cupolas, improvements,

LTV Aerospace Corp.: Underground test lab, salt mine,

Laclede Steel Co.: Continuous casting facility for 150 ton heats of steel, 12/11,

Lake Ontario Steel Co.: Heffernan (president) leads group in forming North Star Steel Co., St. Paul, 11/27, p.59

Lamb Co., F. Jos.: Unit checks core shift, IE, 7/31, p.52

Landis Machine Co.: Ford cooperates with Landis in design and production of TRF gear rolling machine, 9/11, p.71

combines Gibson Machine grinding - production jobs, 9/18, p.126f* Merger with Litton, 9/11, p.19

Larsen's Mfg. Co.: Adhesive bonding for fire extin-guisher cabinet doors, spotwelds eliminated, 7/24, p.64f°

Lear Siegler Inc.: Acquisition of National Broach proposed, 11/13, p.27 Magnetic particles effect clutchbrake response, 7/24, p.69

LeBlond Machine Tool Co., R. K.: Giant lathe, IE, 10/30, p.82

Lees-Bradner Co.: Cycle automatic on thread miller, IE, 9/11, p.83

Leifeld & Co.: Tape controls spinning machine, 10/2, p.15

Leland-Gifford Co.: Vertical drilling unit, IE, 7/24, p.67

Lepel High Frequency Laboratories Inc.:
Firms make induction coupled plasma, IE, 7/3, p.51

ewis Welding & Engineering Injection molder bonds metal-to-rubber parts, IE, 11/20, p.108

Lift Parts Mfg. Inc.: Hydrostatic steering system, IE, 11/27, p.80

Lincoln Machine Parts Corp.: Tolerances closer on skiving tool-holder, IE, 10/30, p.85

Lindberg Corp.: Article: Why Lindberg decided to build furnaces: President Bo-deen, Marketer Peterson, 10/16,

Lindberg Hevi-Duty: See Sola

Linde Div.:

Linde Div.:
Groove welder speeds plate joining, 11/13, p.73
Shop know-how triumphs over 9% nickel steel weld problems (welding technique with fine wire, short circuiting eliminated postweld heat treat), 11/20, p.67

Link-Belt Div.: Conveyor system for shipbuilder, moves large plates and beams, 12/4, p.76s*

intern Corp.: obile air conditioner cuts fur-nace downtime, IE, 11/20, p.110 Mobile air

Liquid Carbonic Corp.: Automatic flame cutter built for Reliance, 11/20, p.102b*

Little Inc., Arthur D.: Harrington report: How NC will shuffle management functions, 9/11, p.75 Soil makes a building block, BMX, 7/24, p.27

Litton Industries Inc.:

Merger with Landis Tool, 9/11, p.19

Lockheed Aircraft Corp.: Building aircraft prototypes, laser aligner may displace jigs, 7/10,

machine tools Computerized machine tools studied, 12/11, p.21
Fabricating motor cases for solid propellent rockets (comparison of production equipment needed for roll and weld vs electrodeposition), 7/10, p.58
Future managers, object urgent, 7/24, p.640*

Computerized

Houghton: Big programs key to future management, 7/3, p.14

Jetliner to carry 300 passengers, model shown, 10/16, p.75

Lockheed-California Co.:

Skilled worker lend-lease agreement with Northrop, 11/20, p.19
Titanium prices vs steel and aluminum, gap closing, 7/3, p.15

Lockheed Missiles & Space Co.: Astronauts on long air missions may use regenerative life sup-port system, 12/11, p.29

Lockheed Propulsion Co.: Lockheed will hog 8 parts of milling machine, 9/18, p.105

Lockheed Shipbuilding & Con-struction Co.: Conveyor and crane moves large plates and beams, 12/4, p.76s*

Loctite Corp.: System meters adhesive, 8/28, p.64

Lodding Engineering Co.:
Profit sharing: Nothing like
money to motivate people
(David Milliken, president),

Loftus Engineering Corp.: Develops air curtain for soaking pit covers, 9/4, p.25

Loma Machine Mfg. Co. Inc.: Hill Acme and Loma add parting machines, IE. 10/23, p.79 Mill also compacts powders into strip, IE, 9/18, p.128

Lone Star Steel Co.:
Pipe facility completed, N-80 oil
well tubing, 7/31, p.21

Loopco Industries Inc.: Fast tooling on slitter line, IE, 12/11, p.114

Lovell Mfg. Co.: Magnetic racks added to overhead conveyor, 8/21, p.50a*

Lubrizol Corp.: rganic phosphate resin prevents shipping rust, IE, 7/31, p.52

Machine: See New Britain Machine

Lufkin Rule Co.: Merging with Cooper Industries, 10/9, p.32

Lukens Steel Co.: Notch toughness in plate steel stands cold or stress, 8/7, p.84*

M

3M Co.: Epoxy adhesive bond, stainless steel fire extinguisher, 7/24, p.64f°

Epoxy coatings for storage tank-maker, 10/9, p.60a* Plastic rail joint maintenance kit, 8/7, p.84h*

Structural adhesive, IE, 8/14, p.78

M&T Chemicals Inc.:

M&T Chemicals Inc.:

Magnetic handler cleans scrap for detinning, 12/25, p.31

Nickel plating process tolerates zinc, 11/27, p.27

Programmed hoist eases plating automation, IE, 7/10, p.69

Protective liquid compound protects during hard plating, IE, 9/4. p.74

9/4, p.74
Vinyl organosol coating, no primer needed, IE, 7/24, p.70

MTS Systems Corp.: Builds fatigue testing system for aerospace fasteners, 10/9, p.60d*

Mt. Vernon Die Casting Corp.: EDM machining, diemaking takes on new look, 8/14, p.57

Machinery & Welder Sales Corp.: Rigid welding boom, IE, 11/13, p.88

Macwhyte Co.: Amsted acquisition, 7/24, p.31 Madison-Kipp Corp.: Miniature discasting via single cavity, 12/11, p.94f*

Magnaflux Corp.: Fasteners test equipment for Bethlehem, 7/10, p.60h*
Scale assembly improves wall thickness gaging, IE, 9/4, p.70
Total NDT capability, exhibit, IE, p.170

Magnus Chemical Div.: Leon Salz: Press lubrication, se-lect forming lube without guess-work, chart, 10/16, p.41

Malayawata Steel Ltd.: Iron and steel plant financed by IFC and five Japanese firms,

Malco Inc.: Nylon Dymax strapping system, 9/11, p.78

Management Selection Ltd.:
Americans seek jobs abroad,
12/4, p.32

Manpower Inc.: Employment survey, demand continues, 10/23, p.23

Marbon Chemical: See Borg-War-

Martin Co.:
Explosive forming with single charge, missile propellent tanks, 11/20, p.102h*
Vacuum brazing-gas quenching tech, joins aluminum containers, 8/7, p. 77

Martin Engineering Co.: Conveyor-Feeder scale, IE, 7/3, p.53 Impacting device, IE, 9/18, p.128

Martin Marietta Corp.: Silicone-based coatings for aero-space use, 8/7, p.84e*

Massey-Ferguson Industries Ltd.: Hart: Farm machine maker tells some welding secrets, 9/11, p.62

Master Machine Tools: Quill type machining heads, IE, 12/25, p.43

Materials Research Corp.: Machined chromium shapes up to 10 by 10 in. for sputtering tar-gets, vacuum casting process,

Maxon Industries Inc.: Changing from spools of welding wire to reels, let-off stands on outside wall, 9/25, p.53

McCreary Industrial Products Co.: Codevelop plastic (FRP) for hol-low steel rolls used in pickling tanks, 10/2, p.28

McDonnell Douglas Corp.: stainless ircraft fittings get brazing, 11/6, p.60

McDowell - Wellman Engineering

Iron ore pelletizer, IE, p.71

McGill Mfg. Co. Inc.: Spherical roller bearing pillow blocks, IE, 10/2, p.66

McGraw-Edison Co.: Sells Lectro Products Div., 10/9, p.32

McKay Machine Co.:
Diescher mill revival at AISE conference, 10/2, p.17
Licensing agreement for Alpha Press, 8/14, p.25
Welding unit combines steps, saves space, IE, 8/21, p.51

McKinsey & Co. Inc.: Overseas salaries for chief ex-ecutives, 10/23, p.23

Merrick Engineering Inc.: Unit controls weld penetration, NASA codevelopment, 7/31, p.17

Mesta Machine Co.: Builds 80 in, hot strip mill for Granite City, 8/14, p.61

Metallurgical International Inc.: Metal processed finer with Cold Stream Impact, 9/4, p.25

Plasma spray for applying powder coatings, 8/21, p.21 Plasma spray, new argon-helium system, 11/6, p.27 Unit speeds ID flamespraying, 9/25, p.53

Micro-Poise Engineering:
Disc brake balancer, IE, 11/27, p.80 Machine balancing, weighing unit, IE, 9/11, p.84

Mid-Continent Mfg. Co.: May merge Huber Corp., 7/3, p.22; approved, 9/25, 6/27

Midland-Ross Corp.:

American Can orders coating line, 10/9, p.32

Merging Unitcast, 8/21, p.24

Surface Combustion instrumentation—hot stage metallograph, 11/20, p.132

Surface Combustion to market world-wide for Hazelett Strip-Casting, 7/31, p.22

Surface Combustion moisture control for diamond grinding wheel, Kathabar equipment, 11/27, p.62

Surface Combustion: R ot a ry quenching of small parts provides uniform hardness, 9/18, p.88

Waldron-Hartig unit roll coats 66 in. strip, IE, 7/31, p.56

Midvale-Heppenstall Co.: Two blades on automatic cold saw, IE, 10/23, p.80

Miller Electric Mfg. Co.: Metallic arc-TIG welding line, IE, 12/11, p.122

Milman Engineering Co. Inc.: DC drive optional in miniature drill press, IE, 11/20, p.110

Mine Safety Appliances Co.: Portable unit gages carbon mon-oxide, IE, 10/30, p.82

Minear Co.: Leaks spotted in air or gas sys-tems, IE, 12/4, p.88

Modernair Corp.:
Acurad diecast aluminum cylinder
heads for pneumatic equipment,

Molded Fiber Glass Body Co.: Plastic premix needs no finishing, 12/4, p.29

Molins Machine Co. I.td.: Automatic system cuts machining labor costs, small parts batch manufacturing, 11/20, p.62

Monarch Machine Tool Co.: Lathe challenges short run eco-nomics, IE, 12/11, p.107

Monroe Auto Equipment Co.: Symposium forecasts auto after-market, 7/31, p.25

Monsanto Co.:

A look at lubricants via color contour mapping may lead to better design of bearings and gears, 11/6, p.67

Moore Products Co.: Fluidic valve controls coolant flow, IE, 8/28, p.89

Moore Special Tool Co.: Grinding head runs at 175,000 rpm, IE, 7/24, p.70

Morse Chain Co.: Packaged SCR controls, IE, 7/24, p.67; 8/7, p.86; 9/4, p.72 Solid state tachometer simply mounted, IE, 9/25, p.82

Motorola Inc.: Tungsten carbide coatings for surface of cutting tools, punches and dies using Ricklinizing equipment, 11/6, p.55

Murco Marketing Co.: TLC plates are of stainless, 10/30, p.25

Murex Welding Products: Metal-plastic shearing machine, IE, 12/4, p.96

Mystic Oceanographic Corp.: Acquired by American Bosch Arma, 12/4, p.31

National Broach & Machine Co.: National Broach & Machine Co.: Acquisition by Lear Siegler pro-posed, 11/13, p.27 Dial-in controls part of precision system, IE, 12/25, p.44 Fluid controlled gear burnisher, IE, 10/16, p.55 Gear tooth honers handle several parts, IE, 11/27, p.80

National Cash Register Co.: Frigidaire computerized dealer transactions, 7/24, p.64

National Electric Welding Ma-chines Co.: Drum welder, IE, 8/28, p.84 Unit welds 'collars' to bars, IE, 12/4, p.98

National Extruded Metal Products Cold extrusion of steel, new jobs, 7/31, p.17
Cold extrusion for ordnance production, 8/7, p.70

National Machinery Co.: Cold former, Boltmaker, 8/21, p.19

National Research Corp.: Pumping speed on vacuum module, IE, 7/31, p.49

National Screw & Mfg. Co.: Merger with White Consolidated, 7/3, p.22

National-Standard Co.: Let-off stands for welders, 9/25, p.53

National Steel Corp.: Gallagher: Predicts finished steel market in '68, 10/23, p.21

National Twist Drill & Tool Co.: Computerized management infor-mation system combines Tele-control shop reporting with Univac realtime computer, 7/17,

Nelson Stud Welding: See Gregory Industries

New Britain Machine Co.: Lucas inspection-measuring chine, NC, IE, 9/4, p.70

Nichols Co., W. H.: Ultrasonic cleaning system, 8/28, p.65

Nordson Corp.:
Nozzle extension sprays inside tubes, IE, 7/31, p.55
Solvent for hot melt flushing, IE, 10/16, p.58
Thermal stability for hot melt adhesives, 10/23, p.24

North American Aviation Inc.: Dr. Abdel-Gawad, geologist: Satel-lite photos spot mineral deposit areas, 9/4, p.68a* and 8/14, p.29

areas, 9/4, p.654 and 5/14, p.29 Cryogenic liquid (coldsoaking) cure for stainless, 11/27, p.22 Ferrite controls weldability, stops cracking in 347 stainless, 7/31,

p.22 Merger ok with Rockwell-Standard and Draper, 7/10, p.32 Solid rotor motor (Nadyne) may drive electric trains, 7/10, p.23 Vertical descent at more than 115 mph, tests submersible vehicles, 8/21, p.23

North American Rockwell Corp.: Formed by merger of three firms, 7/10, p.32

7/10, p.32

Machinability is a computer program: Rocketdyne Div. demonstrates at Campus Engineering Conference, Calif., 10/30, p.62

Profiler shortage in aerospace use, told by Dr. Wilson, 10/9, p.58aa*

North Industries Inc.:
Cold extrusion (licensee for Colfrog cropping tool by International Cold Forging, Monaco),

North Star Steel Co.: Formed by industrialists in St. Paul: Fledgling steelmaker takes on Goliaths, 11/27, p.59

Northrop Corp.:
Giant aluminum tools feature of assembly jigs and fixtures, building (Boeing 747 fuselage), 7/3, p.46
Norair Div.: Automated penetrant dye inspection system checks aluminum extrusions and sheets, 11/20, p.65
Norair makes plastic foam stretch forming dies, 11/20, p.29
Skilled worker lend-lease, Norair Div. with Lockheed-California, 11/20, p.19
Testing breakthrough, sensitivities greater, 10/16, p.17

Norton Co.:

Grinder tailored to 12,000 sfpm, IE, 7/24, p.65 Helicopter seats of light boron carbide faced fiberglas, 11/27,

p.24

Moisture control: Damp diamonds
are nobody's friend, 11/27, p.62

Oakite Products Inc.:
Deep draw lubricant, IE, 8/28, p.84
Solution control unit, IE, 7/3,

Ocean Systems Inc.: Record dives aid conquest, 9/11, p.31

Onsrud Machine Works Inc. Danly acquisition, 8/28, p.32 NC profile mill, IE, 9/25, p.79 Profile-contourer, IE, 12/11, p.120

Orbitran Co. Inc.: Electron weighing system for hot metal at Interlake, IE, 8/7, p.85

Osborn Mfg. Corp.: Vacuuming forming thermoplastic sheets, IE, 11/6, p.72

Ovitron Corp.: Electro-optical and infrared detection systems, IE, 12/25, p.42

Owens-Corning Fiberglas Corp.: Computers control glass furnaces, 10/30, p.29

Oxy-Catalyst Inc.: A fume abatement system, 10/30, p.31

P D C Inc.: Dimension control fits Hardinge chuckers, IE, 9/4, p.72

Pacific Data Systems Inc.: SHOP (language) programming of-fered in NC package, 12/4, p.76r*

Pacific Roller Die Co. Inc.: Coil storage system pushbutton, IE, 8/21, p.54

Palmgren Steel Products: Dual slide tables in positioning, IE, 7/31, p.51

Pandjiris Weldment Co.: Small, portable manipulator, IE, 8/14, p.79

Parker-Hannifin Corp. Basic positioning circuit for air cylinder, 8/7, p.84j*
Fluidic amplifier (Vortex Vent), IE, 11/6, p.74

Park-Ohio Industries Inc.: Tocco units induction harden cam-shafts, 11/27, p.82 and 12/4,

Patterson Machine Co., Geo. C.: Wire straightener, IE, 9/11, p.86

Pennsalt Chemicals Corp.: Attachment ends cracking of thin compacted parts, IE, 9/25, p.84 Rotary presses to compact P/M parts up to 1,500 per minute, 11/20, p.31

Pennsylvania Engineering Corp.: Buys Lectro Products, 10/9, p.32

treat, quench package, IE, 20, p.106 11/20. Tube furnace, IE, 7/24, p.67

Pfizer & Co. Inc., Chas.: Buys Composite Metal Products, 10/30, p.31

Philco-Ford Corp.: Lower cost for integrated circuits for Army, 8/14, p.27

Research Laboratories (Holland) Energy paper battery dev., 12/4,

Phillips Screw Co.: Buys Precision Metal Products, 11/13, p.27

Phoenix Steel Corp.: Electric melt shop, Swindell-Dressler contract, 9/25, p.27 Installing vacuum tap degassing units, German make, 10/9, p.32

Physics International Co.: Dosimeter dev. for material test-ing, 11/13, p.31

Piad Precision Castings Corp.: Opens foundry, copper and copper alloys, Export, Pa., 12/25, p.13

Pickands Mather & Co.: Merger plans with Cerro terminated, 7/10, p.32

Pittsburgh Steel Co.: Combination rumor confirmed, Interlake and Wheeling, 10/9, p.21

Porter Company Inc., H. K.: New switchgear plant, Springdale, Ark., Wks., 11/27, p.24

Power-Gas Corp. of America: May build Imperial smelting proc-ess refinery for New York firm, 8/28, p.19

Powermatic Co.: Manual surface grinder, close tol-erances, IE, 10/9, p.179

Pratt & Whitney Aircraft Div.: See United Aircraft

Precipitair Pollution Control Inc.: fodules pare costs of air pollution units, IE, 12/4, p.93

Precision Fastener Div.: See Standard Pressed Steel

Precision Metal Products Corp.: urchased by Phillips 11/13, p.27 Purchased

Pre-Finish Metals Inc.: Penry Warr ponders spectre of paint guarantees at NCCA meet-ing, 7/3, p.38

Pressure Blast Mfg. Co.: Console blasts parts with wet abrasives, IE, 8/28, p.89 Dry blasting—beads provide matte finish, IE, 11/6, p.71

Pressure Chemical Co.: Liquid crystals made in solid mix-tures, IE, 10/16, p.60

Prime-Mover Co.: Electric walkie straddle stacker, IE, 7/31, p.54

Production Machinery Inc.: Austrian hacksaw and bandsaw, IE, 10/2, p.71

Purex Corp. Ltd.: Turco automated penetrant dye inspection system for Norair, 11/20, p.65

Pyrometer Co. of America: Abrasive tool, blasts wire (thermocouple assemblies), 8/28, p.64

R&I-Ramtite Co.: Formed by merger, Combustion Eng.-Ramtite, 8/14, p.25

Racine & Vickers-Armstrongs Inc.: Roll feed drive, digital control, IE, 8/28, p.86

Racine Hydraulics & Machinery

Four-way valves, IE, 9/18, p.139

Radio Corp. of America: Sarnoff: Environmental managers needed, 11/13, p.21 Experimental system broadcasts printed copy to home, TV pro-gramming, 7/10, p.64s*

Rand Development Corp.: Sludge treatment plant for sewage, 7/24, p.25

Ransburg Electro-Coating Corp.: Adds fluidics to finishing systems, IE, 8/28, p.86

Ransome Co.: Welding positioner, tilt and rotate for B&W, 9/11, p.27

Rauch Corp.: Semigantry crane eases installation costs, IE, 10/2, p.66

Raycon Corp.: Burrfree microhole drilling with NC-EDM combined, 7/17, p.31

Raymond Corp.: Narrow aisle truck, order picking, IE, 8/28, p.84

Merging Badger, 11/13, p.27 Sherwin conducts value engineering seminars for Japanese firms, 8/7, p.73

Redford Corp.:
Aid to cleaning, 'vectored wave excitation,' IE, 10/30, p.84

Reliance Electric Co.: Acquiring Toledo Scale, 9/11, p.27 Double worm reducer, IE, 7/17, MotoDrive pares 24% from drive weight, IE, 7/24, p.68 Cover pic. Product managers viewed by Geuder, 8/21, p.47

Reliance Steel & Aluminum Co.: Automatic flame cutting does pre-cision jobs fast, 11/20, p.102b*

Reltec Inc.: utoff line, payout time 11 months, IE, 8/14, p.80

REM Sales Inc.: Mill, grinding unit fits cuttermak-er's needs, IE, 8/28, p.90 Refinements added to milling ma-chine, IE, 9/18, p.137

Remington Rand: See Sperry Rand

Republic Industrial Corp.:

Merger with Valley Mould forms
Vare Corp., 10/23, p.31

Merger terms with Valley Mould,

Republic Steel Corp.:
Alloy for landing gear forging, 7/24, p.25
Basic refractory bonding dev., 8/14, p.99
Cold extrusion seminar in ordnance production, 8/7, p.70
Contracts for continuous hot strip

mill, Cleveland Wks., 7/24, p.31
Expands facilities for pre-engineered steel buildings, Truscon plant, 11/13, p.27

Resources for the Future Inc.: Manganese nodules first harvest from sea, 10/30, p.29

Reuland Electric Co.: Hydraulic motors, pump mount types, IE, 9/25, p.84

Rex Chainbelt Inc.: Acquires Camloc, 11/20, p.32; negotiations, 7/24, p.31 and

Reynolds Metals Co.: Acquiring Foote-Burt, 11/20, p.32 Mass transit study, 7/17, p.25

Rheem Mfg. Co.: Acquiring Texas Gulf Tank, 9/11,

Richards Co., J. A.: Bridging unit notches steel rule for dies, IE, 7/10, p.72

Rival Mfg. Co.: Collar rivet pins solve terminal contact problem, carving knife handles, 8/7, p.78

Roberts Corp., C. B.: Power hacksaw, IE, 9/11, p.95

Roblin Steel Corp.: Argon cover ends continuous casting problem, 12/25, p.31

Robotron Corp.: Induction preheating aids stud-welding unit, IE, 12/18, p.65

Rocket Research Corp.: Pulsing of small control rocket engine, fired million times, 10/9,

Rocketdyne Div.: See North American Rockwell

Rockwell Mfg. Co.: Drill press features variable drill point plus, 12/11, p.27
Noncontact pyrometer, IE, 7/3,

Rockwell-Standard Corp.: Merged with North American and Draper, 7/10, p.32

Rodgers Plastics Equipment Inc.: Unit heat seals injection molded parts, IE, 12/4, p.93

Rohr Corp.: Automated warehouse, computer controls, 11/6, p.61

Rolls-Royce Ltd.: Automated blade production, 9/11,

Roth Corp.:
Bar handling system automated,
IE, 11/20, p.104

Roth Steel Tube Co.:
Constant weld pressure boosts
tube mill electrode life, made by
AEF, 11/20, p.64

Rotor Tool Co.: Portable air tools, 11/6, p.32

Rowe Machinery & Mfg. Co.: Straighteners handle coil widths, IE, 8/21, p.58

Ruthman Machinery Co.: Coolant pumps, nonclogging, IE, 10/2, p.64

Ryerson & Son Inc., Joseph T.: Adds titanium in sheets, plates, bars, IE, 10/2, p.72

S-P Mfg. Corp.: Pneumatic chuck, IE, 7/24, p.69

SCM Corp.: Merger of Glidden approved, 9/18, p.27

SKF Industries Inc.: Analytical tool zeroes in on trace elements, study fatigue life of rolling bearing made from dif-ferent heats, 12/18, p.56a*

Sandia Corp.: Fluidics test nuclear weapons, 10/23, p.27 Laser charts surface velocity, new interferometer, 10/23, p.25 Rolamite, new bearing, 10/30, p.21

Sandvik Steel Works (Sweden): Edstrom: Swedish industrialists to view U. S. quality markets, 12/18, p.48

Satellite Alloy Corp.: Silicon carbide process cuts costs 30%, Ament production method,

Scientific & Industrial Research (New Zealand): Automatic heat treating plant in lab, 7/31, p.48b

Scientific Electronics Group Inc.: Circuit-Tron prevents explosions, IE, 9/4, p.76

Selas Corp. of America: Automatic brazing unit, IE, 10/30. Four-in-one cutting oil ends down-time, ups speed, 11/27, p.70b*

Sensi-Tronics Inc.: System protects dies, controls bin levels, IE, 10/23, p.84

Sentry Co.: Vertical tempering furnaces, IE, 11/20, p.104

Servo Products Co.: Power table feed for Bridgeport mills, IE, 7/17, p.92

Sever-Hall: Bin level indicator, IE, 10/2, p.65

Sharon Steel Corp.: Coil annealing time cut with automatic transfer car, 11/20, p.32

Shell Chemical Co.: Forging plastic parts, solid phase forming, 12/25, p.18

Shredmaster Corp.: Shredder—secret papers, prints, etc., IE, 7/31, p.52 blue-

Signal Oil & Gas Co.: Merger with Allis-Chalmers, 12/4, p.21

Signode Corp.: Strapping system bands a minum extrusions, 9/11, p.78

imonds Abrasive Div. ee Wallace-Murray Corp.

Sintaloy Inc.: Precision molding press, 100 ton for powder metal parts, 12/4, p.29

Sivyer Steel Casting Co.: Analog computer control system cuts power charge, 8/14, p.31

Sloan Instruments Corp.: Electron beam gun, compact, IE, 9/18, p.132

Smith Corp., A. O.: Steel molding powders, IE, 11/13, p.87

Sola Basic Industries: Buys Engineered Machine Builders, 12/25, p.13

Lindberg markets commercial electroslag refining equipment, 11/27, p.24
Sola Electric, three zone controls, IE, 7/31, p.54

Solar Div.: See International Harvester

Southeastern Engineering Co. Inc.: Unit serves as fluid power lab, IE, 10/9, p.177

SpeedFam Corp.: Free abrasive machine, IE, 10/9, p.175

Speer Carbon Co.: Dr. Pearce: Coke grades selected in making graphite, 7/10, p.27

Sperry Products:
See Automation Industries

Sperry Rand Corp.:

Magnetic thin-film memory for Univac, 8/28, p.23

Remington Rand, automated filing system for Farrel (Lektriever), 11/6, p.70d*

Univac computer controls containership cargo, 8/7, p. 84j*

Univac linear program speeds decision making, Omega Package, 12/4, p.76f*

Univac's Uniscope 300 communications terminal, IE, 7/3, p.47

Vickers vane motor, IE, 11/20, p.113

Spraymation Inc.: Heated nozzle ends clogging, IE, 11/27, p.81 Hot melt system, IE, 12/4, p.86

Square D Co.:
Acquiring Barkelew Mfg., 12/11, p.32

Flush starter enclosure for 'cosmetic' effect, IE, 12/4, p.97 Scrap magnet, IE, 12/18, p.64

Stacy-Gifford Co.: Buffing machine, IE, 8/21, p.55

Stanat Mfg. Co. Inc.: Slitter cuts foil, heavy gages, IE, 8/28, p.90

Standard Pressed Steel Co.: Aerospace fasteners have higher fatigue life, 7/31, p.48b Fatigue testing system for aero-space fasteners, 10/9, p.60d*

Steel Co. of Canada Ltd.: Direct reduction process for elec-tric furnace, 7/31, p.22 Hellan fluid water strainers keep industrial water clean, Hilton Works, 10/9, p.58d*

Steel Structures Co.:
Epoxy coatings, corrosion resistant, 10/9, p.60a*

Stellite: See Union Carbide

Stem Inc., Chester C.: Ultrasonic detection for bearings, 8/28, p.64

Stone Machinery Co.: Insert prevents screws, bolts from loosening, 11/27, p.64

Structural Metals Inc.: Billet furnace rebuilt while still operating, 7/10, p.62

Stupp Corp.: Line pipe mill near Baton Rouge, 8/21, p.24

Sunbeam Equipment Corp.: Draw furnace, timed heating sequence, IE, 10/16, p.58
Shuffle hearth furnace, IE, 8/7,

Sundstrand Corp .: Automatic machine shop, Aircraft Div., 10/16, p.22 Electrochemical machining cylinder blocks for aircraft engines, 12/11, p.94h*

Superior Electric Co.: Rotary tables precise in angular location, IE, 9/25, p.82

Surface Combustion: See Midland-

Swift & Co.: Epoxy adhesive, IE, 10/23, p.83 Fusion type paint, metal coating, IE, 8/28, p.86 Heat cured adhesive is resealable,

Swindell-Dressler Co.: Swindell-Dressler Co.:
Aluminum soaking pits for German firm, 7/31, p.62
Rotary hearth, wheel block furnace for Homestead Wks., 8/28, p.74*

Sylvania Electric Products Inc.: Acquisition of Driver Co., Atomic absorption analysis spectrophotometers, speed and precision, Chemical & Metallurgical Div., 12/11, p.82

Makes automatic rail car identification system, 10/16, p.15

Symmeo Inc.: Secondary machining expands P/M application, 9/11, p.61

20th Century Sales Corp.: Way type tapping-drilling unit, IE, 7/31, p.55

TRW Inc.: 1968 outlook, aerospace sales, 12/11, p.141 1970 laser market estimated, 7/3, p.22
Dr. Fried: How to save with computer design, 10/30, p.65
Merger of IRC Inc. proposed, 11/13, p.27
Merging United-Carr, 11/27, p.27
Study high temperature polymers as metalworking lubricants, 9/11, p.31 and p.82h*
Switch speeds transfer to standby power, IE, 9/11, p.93

Taber Instrument Co.: Automatic centerless bar turning unit, IE, 9/25, p.79

Taccone Corp.: Process slices open arc welding time, switch from manual to semiautomatic, 8/28, p.71*

Taylor Instrument Companies: Controller drives bidirectional mo-tor, IE, 8/28, p.8 Indicating pneumatic controller adaptable for local control loops, IE, 11/6, p.75

Taylor Machine Works: Narrow aisle truck, IE, 7/31, p.50 Sideshift for forktruck, IE, 8/14,

Taylor-Winfield Corp.: RF generator, safety factor (for Ford transmission plant), IE, 11/20, p.112

 $\begin{array}{ccc} \textbf{Tecto Corp.:} \\ \textbf{Lightweight} & strapping & rail, & \textbf{IE}, \\ & 10/16, & p.56 \end{array}$

Telecontrol Corp.: Computerized management infor-mation-reporting system, with Univac 418, 7/17, p.73

Teletype Corp.: Page printer aims ink droplets, IE, 12/18, p.65

Systems approach for long range planning used at GE, 8/14, p.64

Tenor Co. Inc.: Long, unusual sequences can be taped cheaply on tape program-mer, 8/28, p.72*

Tescom Corp. Miniature torch gives needle point flame, IE, 7/24, p.71 Stag horn tips heat both sides, IE, 11/20, p.114

Texas Instruments Inc.:
Antiskid research with Kelsey-Hayes, other electronic devices for cars, 8/14, p.21
Clad metals — metalworking's \$1 billion infant, materials systems,

billion infant, materials systems, 9/18, p.75
Benefits of cladding precious metals, 8/28, p.65
Hourly workers put on salary, 12/11, p.89
Three layer clad metal gives steam iron soleplates appeal of stainless finish, 9/4, p.27
Haggerty predicts growing market for integrated circuits, 11/6, p.23

Textile Machine Works:
Auto-Forge process, 7/10, p.56
Casting-forging automated, 7/3,

Thayer Scale: See Cutler-Hammer

Thermal Dynamics Corp.: Positioning mechanism for welding torch, IE, 7/10, p.69

Thermo Electric Co. Inc.: Indicating thermocouple controller, IE, 10/9, p.166

Thomson Industries Inc.: Mill-drill table template controlled, IE, 8/21, p.55

Thriftmaster Products Inc.: Spindle head combines dr tapping, IE, 8/28, p.85 drilling-

Timesavers Sanders Inc.: Wide belt grinder speeds plunge work, IE, 11/20, p.104

Timken Roller Bearing Co.: Bearing lines, rating increase, 12/11, p.27
Movie (business-economic system), pizzas and platters, 9/11, p.17
Precision taper measuring machine assures master gage accuracy, 7/3, p.21

Toledo Scale Corp.: Merger with Reliance, 9/11, p.27

Towmotor Corp.: Attachment for dumper, IE, 8/14,

Trasco Corp.:
Boring cartridge design, IE,
10/16, p.56

Automated storage device for convention handling systems, 8/7,

Tridair Industries Inc.: Calfax Div., bolt-nut has positive locking, 9/25, p.59

True Temper Corp.: Acquired by Allegheny Ludlum, 8/14, p.27

Tubotron Inc.: Desalination tubing, 12/4, p.73 Tubing ID embossed, IE, 12/4, p.88

Tucker Steel Corp.:
Acquired by U. S. Industries,
11/20, p.32

Turco Products Div.: See Purex Corp.

Tyco Laboratories Inc.: Sapphire fiber for metals and plastics produced in continuous lengths, 10/30, p.21

Tysaman Machine Works: Simple (scheduling) chart gets new product to market, new head design for abrasive cut-offs, 7/31, p.48

Uarco Inc.; Optical scanners for data input eases document bottleneck, 11/13. p.77

Udylite Corp.:
Electropaint (Cyclemaster) installed at GE's Salem, Va., plant, 7/10, p.55
Electropainting equipment saves floor space, 7/3, p.21
Merges into Hooker Chemical, 11/20, p.32
Stretch Your Nickel, plating tips, booklet, 7/17, p.25

Unimation Inc.: Industrial robots for Europe, licensed, 7/3, p.19

Union Carbide Corp.:
Carbon Products: Connecting pin improves furnace electrode joints, IE, 11/20, p.112
Emerging technologies: Rolling Udimet 700 into sheet; NC machining method corrects form errors, 11/13, p.31
Instruments Dept.: Unit detects pollution in water, IE, 11/20, p.113

p.113

Science enriches decision making, management scientists, 11/27,

Smelting furnace installed at Alloy, W. Va., plant, 11/13,

p.84 Stellite Wks., alloy parts finishing facility, 10/30, p.72a* Stellite: Cold mill produces pre-cision bars and pipe, 8/28,

p.70*
Stellite: Electroclad refractories lick corrosion problems, 10/9, p.58u*

See also Linde Div.

Union Tank Car Co.: Accordion tankcar, 9/25, p.29

Union Tool Corp.: Curtain coater, IE, 11/6, p.72

Uniroyal Inc.: Cold forming plastic sheets, 8/7, p.31

Unit Process Assemblies Inc.: Thickness gage has direct numerical readout, IE, 11/27, p.80

Uniteast Corp.: Merged into Midland-Ross, 8/21, p.24

United Aircraft Corp.:
Hamilton Standard: Automaker researches new cold cathode electron beam welding process, 'Cathobeam', 10/23, p.74d*
Hamilton Standard: EB welder for jet aircraft maintenance, 12/4, p.72

p.72
Hamilton Standard: Partial pressure kit converts EB welders, IE, 10/30, p.79
P&W flame cutting heavy titanium bar stock, 11/27, p.28

United-Carr Inc.: Merger with TRW, 11/27, p.27

United Engineering & Foundry Co.: May consolidate with Wean, 12/25, p.29

United-Greenfield Corp.: Acquiring Accurate Spring Mfg., 11/27, p.27

United Shoe Machinery Corp.: Acquires Warren Fastener, 11/20, p.32 p.32 Approves combined United-Shoe and United-Carr, 10/2, p.23

U. S. Burke Machine Tool Co.: Horizontal milling unit, IE, 8/7, p.93 Machine to mill simultaneous flats, IE, 11/20, p.116

U. S. Electrical Motors: Gearmotors resist corrosive atmospheres, IE, 12/4, p.93

United States Gypsum Co.: Merges A. P. Green Refractories, 12/4, p.31

U. S. Industries Inc.:
Acquiring Barsteel, 8/28, p.32;
negotiated, 10/30, p.31
Acquires Tucker Steel and Prescolite Mfg., 12/18, p.32
Acquires Tucker Steel, 11/20, p.32
Clearing Div. stamping presses for
Flat-USSR, 9/25, p.27 and p.32

U. S. Steel Corp.:
Base price reduction on long terne steel, 12/11, p.23
Blough sees stronger 4th quarter, 7/31, p.14
Blough explains profit drop, 11/6, p.21

Steel import quotas, Blough:

p.21
Blough: Steel import quotas, 11/20, p.21
Gott hopes for early settlement, 7/17, p.21
Gott: Computer frees foremen of detail, 11/27, p.21
Chicago South Wks., new blast furnace, 9/11, p.82h*
Homestead Wks.: Rotary furnace replaces box furnaces at Wheel & Axle Div. plant, 8/28, p.74*
Industrial gas uses, rapid growth reported by Estes, 8/14, p.29
Nickel alloy steel for cryogenic applications, IE, 8/21, p.56
Ore carrier (jumbo size) to use new Poe Lock, 10/30, p.21
Product managers viewed by John Todd Jr., 8/21, p.45
Stanley Strapping: Tie band machine cuts scrap, Pittsburg, Calif., Works, 8/21, p.50e*
Steel microstructures probed with electron microscope, 9/11, p.25
Texas Wks., 160 in. plate mill and heat treating facilities started, 10/2, p.23
Wallace made exec. v. p., 9/25,

10/2, p.23 Wallace made exec. v. p., 9/25,

p.23 Wire Vire rod price schedule revised, 10/16, p.65

United Utensils Co. Inc.: Bagel boiler, IE, 9/11, p.85

Univac: See Sperry Rand

Universal American Corp.: Merger with Gulf & Western, 12/4, p.31

Universal Gas Plating Corp.: Battery electrodes gas plating, 8/28, p.25

Upton Electric Furnace Co.: Transfer unit automates salt bath, IE, 10/9, p.167

V & O Press Co. Inc.: Adds OBI geared presses, IE, 9/4, p.74 NC forming press concept, IE, 7/10, p.65

Vacu-Blast Corp.: Console dry honer, IE, 10/9, p.165 Peeners supplied to General Dyna-mics for use on F-111 bomber, mics for u 8/14, p.32 Vacu-Blast

acul-Blast process: Prepainted steel sheet spot cleaned for welding, 9/18, p.112h*

Vacuum Industries Inc.: Tantalum elements in vacuum furnace, IE, 9/11, p.83

vacuum furnace continuously carburizes refractory metals, 12/11, p.94a* Vacuum hot press applies 65 tons, IE, 7/31, p.49 Vacuum hot press furnace, IE, 10/9, p.176 continuously furnace

Vaill Engineering Co.: Automatic double end for machine, IE, 12/11, p.112 forming

Valley Mould & Iron Corp.: Merges with Republic Industrial to form Vare Corp., 10/23, p.31 Merger terms with Republic Indus-trial, 8/21, p.24

Van Dyck Corp.: Cosponsors with STEEL: Product concepts for tomorrow's megalopolis, public problem markets, 9/4, p.S-24

equired by Youngstown Sheet, 9/11, p.102 Van Huffel Tube Corp.: Acquired

Vare Corp.: Formed by merger, 10/23, p.31

Varian Associates:
Microwave heating system bought
by automaker, 12/4, p.31
Recorder—direct writing via electrostatic printing and integrated
circuitry, 7/31, p.17

Varian Associates of Canada Ltd.: Laser welding (Linde) tubes cuts reject rate to zero, 7/10, p.64s*

Vasco: Exhibits high strength materials, IE, 10/9, p.172

Vaughn Machinery Co.: Acquired by Wean, 11/20, p.32

Vero Precision Engineering Ltd.: Rotary transfer, gang mill cuts 90% from milling time, slots in turbine blades, 8/28, p.29

Vesuvius Crucible Co.: Ceramic furnace stopper heads, isostatically pressed, 8/7, p.29

Vibro Mfg. Co. Inc.: Equi-Flow coater, applies hot met-al coatings, IE, 8/21, p.54

Vickers: See Sperry Rand

Virginia Electric & Power Co.: Nuclear powerplant, 10/23, p.31

Walcon Corp.: Flying cutoff electronic control, IE, 12/18, p.63

Waldron-Hartig: See Midland-Ross

Wallace-Murray Corp.: Simonds Abrasive: Mirror bright metal finishing may reflect wasteful production effort, 8/21,

Ward-Riddle Co.: Drill heads for gun drill, IE, 7/10,

Warner & Swasey Co.: Agreement to purchase Sargent Eng., 8/21, p.24 and 9/18, p.27 Numerical readout not lost if power fails, IE, 7/10, p.72 Vertical balancer, Wiedemann Div., IE, 9/4, p.71

Warner Electric Brake & Clutch Co.: From artwork to NC tapes, 7/24,

p.29
Web tension control package, IE, 10/30, p.79

Waterbury Farrel: Jones & Lamson: Turret adds versatility to machine, IE, 8/7,

Waukee Engineering Co.: CIM meeting report by Onan: Owner-managers meet to find solutions to their special prob-lems, 11/20, p.71

Waukesha Motor Co.: Merges, 8/7, p.32; 8/28, p.32

Wean Industries Inc.: Article (STEEL Feature): Wean make its move—decides to build rather than sell or merge, 12/25

Acquisition of Vaughn Machinery, Acquisition of Vaugin Machinery, 11/20, p.32

May merge United Engineering & Foundry, 12/25, p.29

Scrap chopper improves knife life, cuts noise, 8/7, p.80

Scrap chopper benefits, IE, 8/14, p.77

Welding & Steel Fabrication Co. Inc.:
Rapid/Bonder—packaged autoclave
system, IE, 12/25, p.43
Vacuum-pressure system, IE,

7/24, p.67

Wellman Engineering Corp.: British outlet builds steel plant in Yugoslavia, 12/4, p.32

West Instrument Corp.: Thermocouple immersible in metal, IE, 7/24, p.71

Western Electric Co.: Extrusion method coats wires with two plastics, 12/25, p.15

Westinghouse Air Brake Co.: Fluidic valves, IE, 10/2, p.66

Westinghouse Electric Corp.:
All-electric building for Pittsburgh headquarters, 8/28, p.23
Computer cuts arc furnace power cost, IE, 9/4, p.69
Computer leasing via third party, 12/4, p.23 12/4, p.23
Desalting plant conceived with dual role, 7/10, p.25 Ferrous diecasting program, 10/16,

Ferrous discasting program, 10,70, p.21
Electric utility vehicles, battery powered, IE, 12/11, p.121
Gearmotors, variations, IE, 7/17, p.91
Laser lab rent or lease, 8/21, p.50d*

Laser pumping-ball of light approach, 12/4, p.25 Photovoltaic diode detects fire, IE, 7/3, p.49

Plasma arcwelding reported by Privoznik, Lester, Pa., Large Turbine-Steam Div., 7/17, p.80 Product managers viewed by Merton York, marketing v. p., 8/21,

ton 101k, marketing v. p., 8/21, p.44
RF induction heating generators, IE, 8/21, p.57
Rail commuter cars, propulsion systems, 8/14, p.27
Semiconductor prices to stabilize, 11/13, p.27
Shipping cask for transport of spent fuel from nuclear power-plant (cover pic.), 11/13
Silicon diodes aid electrostatic air cleaning, 10/9, p.29
Slurry bonds reactive metals, 8/21, p.17
Solid state homes and autos by 1970 forecast, 11/13, p.25

p.17 blid state homes and autos by 1970 forecast, 11/13, p.25 Surge comparison tester, IE, 9/11,

n 90

p.90
Ultrasonically assisted rolling of metals comes to halt, but still promising, 8/7, p.84a*
Ultrasonic cleaning system built for Diecraft's miscroscope parts, 11/20, p.102m*
Underwater station proposed, pic., 7/3, p.19

Wheeling Steel Corp.: Combination with Pittsburgh Steel and Interlake, rumor confirmed.

White Co., S. S.: Makes tiny air abrasive tool, welding job, 8/28, p.64

White Consolidated Industries Inc.: Bullard merger negotiations, 10/16, p.19
Merges National Screw, 7/3, p.22
Oil clutch lift truck feature, IE, 11/27, p.79

Wiedemann Div.: See Warner &

Worcester Valve Co. Inc.: Automated storage speeds produc-tion, Triax system, 8/7, p.74

Wotan Div.: See Hunter Douglas

Y

Yoder Co.: EB tube welding goes out-of-vac-uum, 10/23, p.60 Package slitting line, one base, IE, 9/4, p.73 Y-Line slitter, IE, 7/17, p.96

Youngstown Sheet & Tube Co.: Acquires Van Huffel, 9/11, p.102 Buys plating facilities, 'tin-free steel,' Indiana Harbor Wks., 8/7, p.21 Plant for tubular goods planned, Campbell, Ohio, 7/24, p.21

Zero Blast-N-Peen: Dry blast common to to chines, IE, 10/9, p.172 two ma-

Zirconium Corp. of America: Zirconia tundish nozzles, IE, 9/4, p.73

Zurn Industries Inc.: To buy Metal Bellows, 12/25, p.13

U. of ILL. LIBRARY

MAR 20 1969

CHICAGO CIRCLE